

## CIO

## WebBusiness

SECTION

APRIL 1, 1999

140 PAGES IN

TWO SECTIONS

Is your company ready  
to shell out big bucks  
for a **Point Person** to  
lead all Web initiatives?



You Bet



No Way



Can't Decide

(check one)

Our expert panel was split on the question PAGE 28

## ALSO INSIDE

How Bad Site Design Drives  
The Customers Away

PAGE 38

## FYI

Each copy of **CIO Web Business**  
takes a cross-functional look  
at leveraging the Web to add  
enterprise value.

*Thought you might be interested...*

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# WebBusiness

SECTION

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SECTION 2

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*By Peter Fabris*

## COVER STORY

“Established corporations would benefit from this shock to the upper ranks.”

—Jeffrey Rayport



Photo by  
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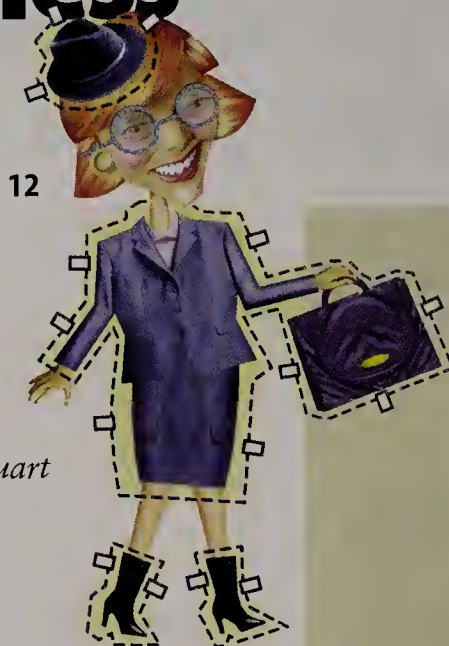
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**YEAR 2000 CHALLENGE** CIO looks at the 50 states and how they stack up in the race for Y2K compliance.

**VIRTUAL PRIVATE NETWORKS** If you think VPNs are just for small businesses, think again. A surprising number of billion-dollar businesses are using the technology to extend their presence around the globe—and saving a bundle.

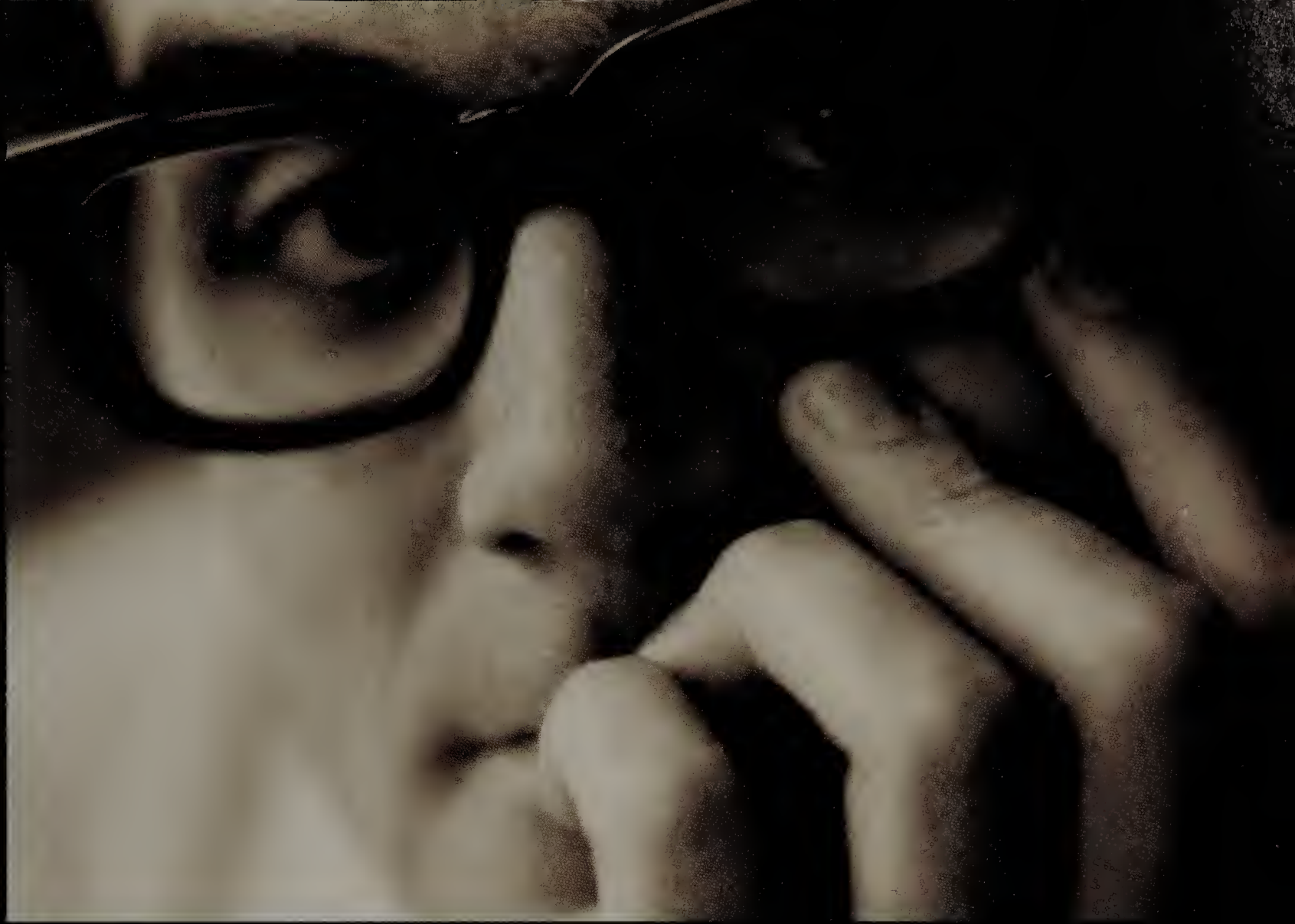
**THINK TANK** We continue to gather more and more information, but what are we doing with it?

**FINE PRINT** Vendors and integrators like to dump hardware sizing risk in the CIO's lap. Don't let them.

**EMERGING TECHNOLOGY** With these new solutions, you can kick-start your HR software's capabilities.

**SHOP TALK** Wisdom from Pat Wallington as she retires from Xerox.





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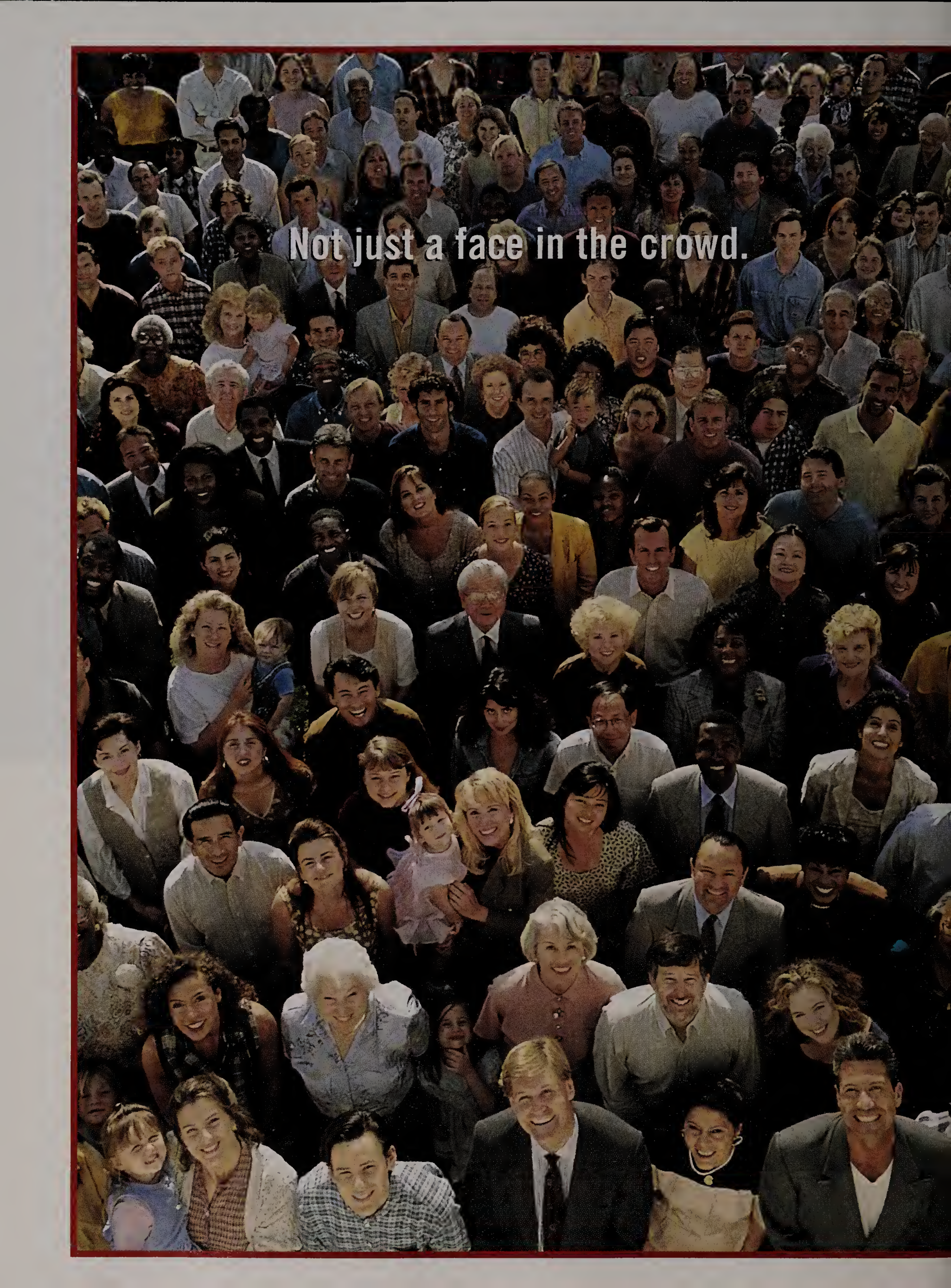
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Not just a face in the crowd.



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# Chief What Officer?

**W**E ASK AN IMPORTANT QUESTION ON THE COVER OF THIS ISSUE—AND in the round-robin story that begins on Page 28: Is your organization ready to shell out big bucks for a Chief Web Officer? Do you need somebody to be the linchpin, lightning rod and cyberseer for all things Webbed that your enterprise undertakes? Or would such a role amount to yet another senior-level apparatchik who would simply get in the way and be tripped over?

Now, the suspicious among you might suppose that we—being accustomed to advocating chiefness for a broad population of technology professionals—are perhaps market-testing a new magazine in the tradition of *CIO*.

Nothing could be further from the truth!

In reality, we take this chief thing seriously. If there isn't a genuine need, then it shouldn't be done. Indeed, we hear fairly regularly from people at companies where they've just decided to hire their first CIO. This suggests two things: first, that businesses are actually quite conservative when it comes to jumping on the title-creep bandwagon, and second, that organizations do sometimes step back, take a good, hard look at themselves and recognize that a formerly unfelt need has become pressing.

We think the CWO question is important because the Web itself is becoming significant to business. As we hunker down to judge entries for the Third Annual CIO Web Business 50/50 Awards, we expect to find dramatic increases in the overall degree of difficulty of what Internet sites are attempting to do with

and for their customers. We expect to find intranets that are deeply insinuated into their organizations' varied and complex business processes. And we expect to see extranets serving multiple partners in industry supply chains. Anything less will be a disappointment.

Even as we brace for startling evidence of radical business transformation, the need for a line position embodying Web leadership is by no means self-evident to our small research sample. The half dozen opinions Senior Editor Art Jahnke solicited for the CWO round-robin (two said yes, one maybe and three voted no) are probably a rough approximation of general opinion among those who have given the matter any thought at all. Over time, I suspect we will begin to see small numbers of organizations create a CWO position. The role will arise most precociously in businesses presenting two basic symptoms: the lack of any coherent strategic direction for Web initiatives and abundantly clear Web-driven business opportunities.

For those who go there, the gambit may or may not ultimately succeed. And the rest of the world may decline to follow suit. But some businesses will decide to do this. And time alone will tell whether CWOs become a movement, a durable rarity or a goofy footnote.

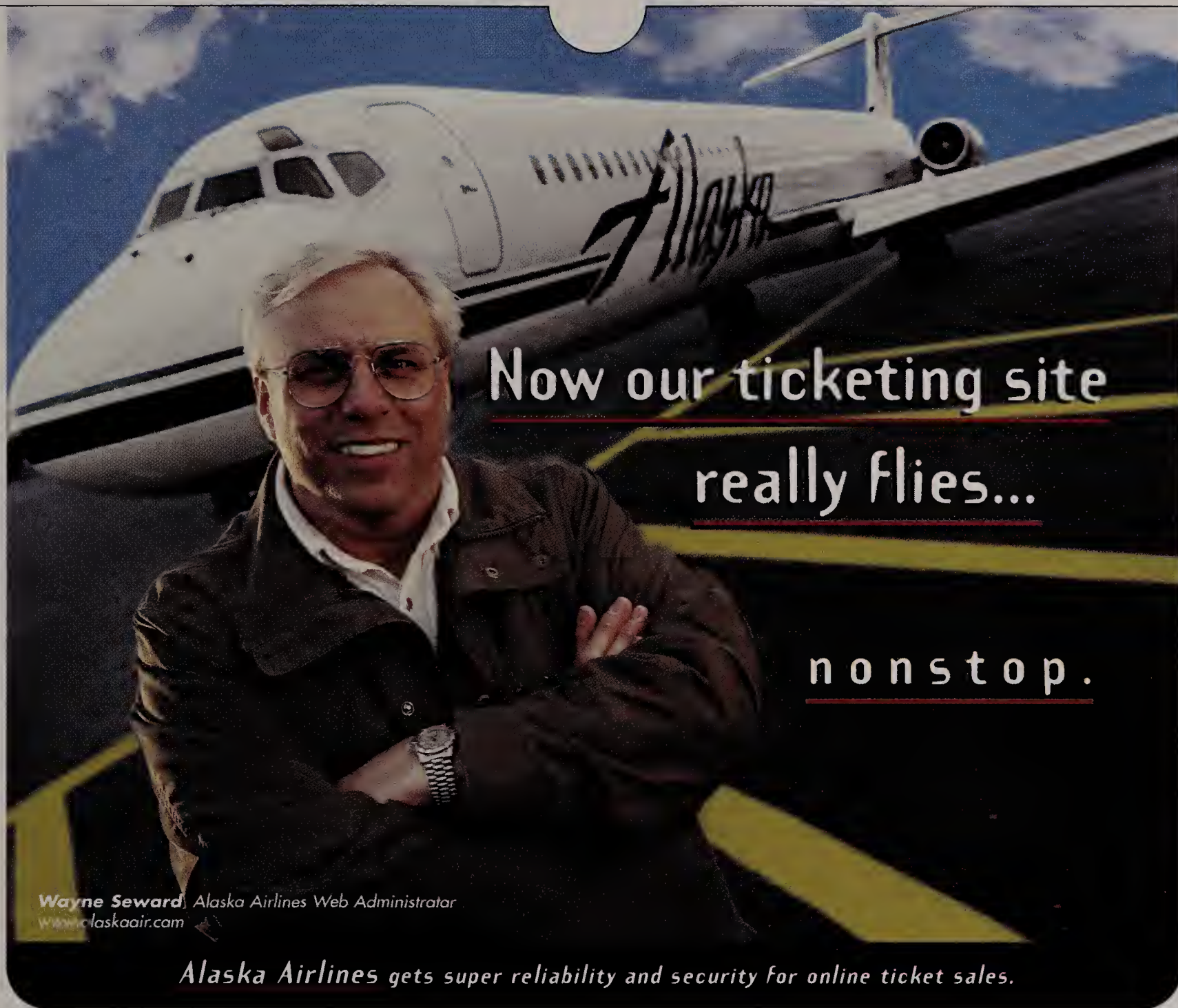
Yes, no or maybe? Let us know how you would vote.



  
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# Your Serve

**J**AN. 1, 2000, WILL MARK NOT ONLY THE BEGINNING OF A NEW millennium but also the end of the client/server era. I don't mean that client/server systems will disappear. What I do mean is that virtually every client/server application is on the brink of obsolescence. If CIOs do not change their thinking about applications, they will find themselves put out to pasture.

Almost every application in today's enterprise, whether an e-mail system or an ERP application from PeopleSoft Inc., Oracle Corp., Lotus Development Corp., SAP America Inc., The Baan Co. or other vendors, can trace its legacy to a client/server platform. The problem with these architectures in the world of the Web is that we don't know how many clients will access any given application. Is it hundreds, thousands or millions? On the Internet, scale

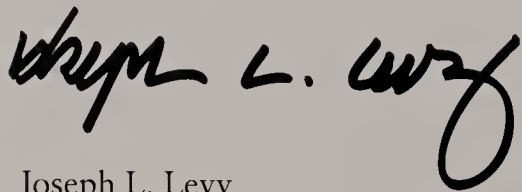
counts.

As your business expands to include IT-driven relationships with your vendors, resellers and customers, applications created on a client/server platform won't be able to handle the load. Look at what's starting to happen with online trading systems. As a consequence, you will spend a great deal of time and energy trying to get these applications to play a role they were never meant to handle.

Naturally, the vendors of these applications will try to help you buy time by improving the scalability of these applications. But in the end it won't be enough as the need for universal access continues to grow exponentially.

It's interesting to note that the major ISPs have opted for e-mail systems designed specifically for the Web. They don't use Exchange or Notes. This scenario will play out across the enterprise over the next few years. In my opinion, many startup firms will market new Web-based applications for the enterprise.

Will you be spending your time trying to prolong the life of client/server architectures in the Internet Age or has the time come to embrace the new Web order before those applications have a negative impact on your company and your career? What's your opinion? As always, I appreciate your thoughts and comments.



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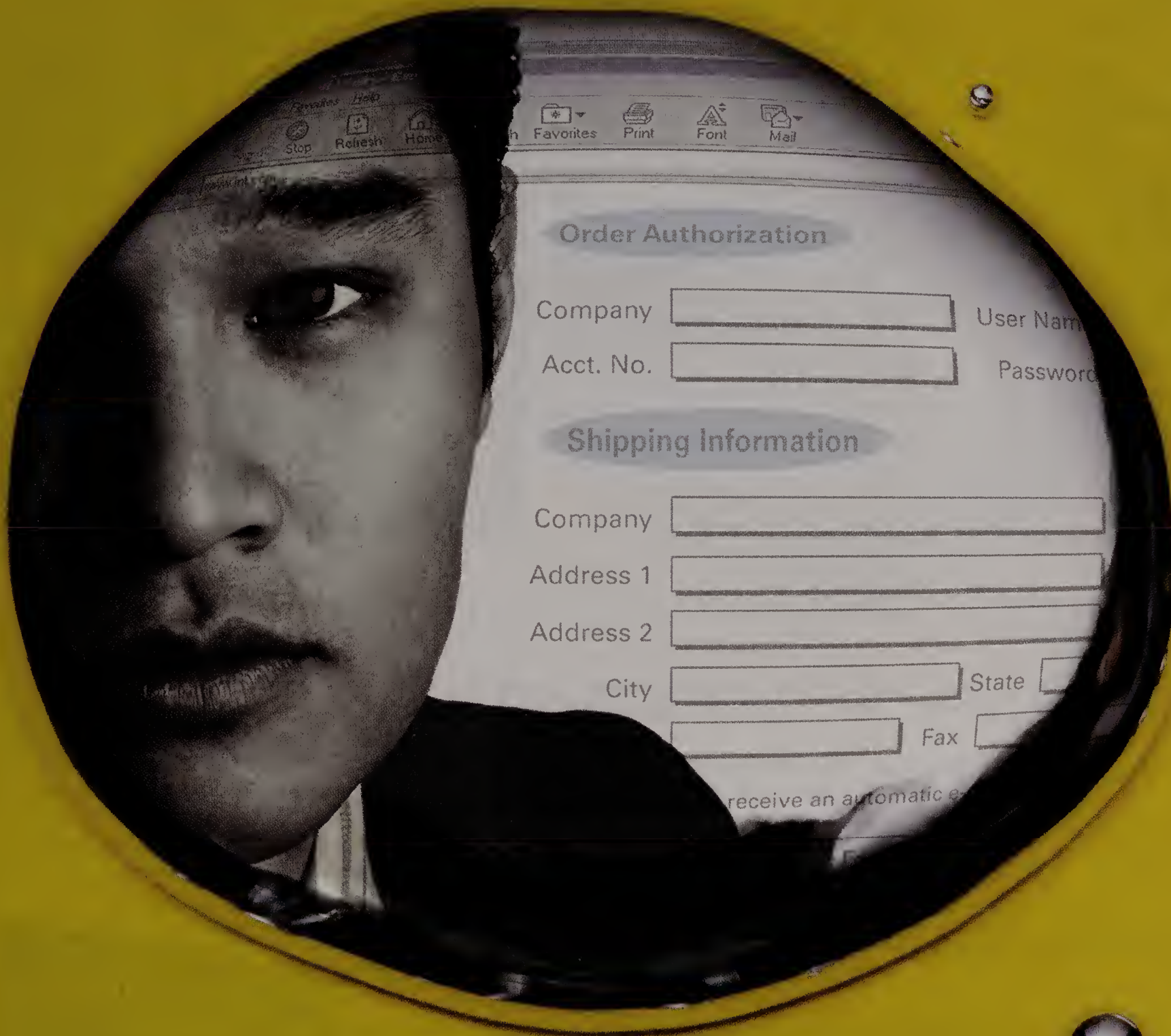
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# THREADS

## CIO.com: Warts and All

**W**E AT CIO SPILL LOTS OF INK ADVISING people how to get the most from their Web investments. This month, as we preach about the importance of making Web sites easy to use (see "Mazed and Confused," Page 38), we've put our own Web site to the test: We asked Louis Rosenfeld, president of Ann Arbor, Mich.-based Argus Associates Inc. and co-author of *Information Architecture for the World Wide Web* (O'Reilly, 1998) to critique CIO.com.

**Rosenfeld:** CIO.com's main page holds lots of information: 76 discrete links, 3 major navigational areas and at least a dozen content areas. It is visually overwhelming. A main page should answer the major questions that users have when they arrive at the site. This page tries to answer every question.

Much of the site's organization system mirrors sections in the print publication (*CIO Web Business*). The site also includes an Exclusively Online area. These distinctions are irrelevant to many Web users; they'd probably prefer to see all available content and see it organized by subject (such as Electronic Commerce).

CIO's labeling system uses consistent terminology though the terms can be confusingly overlapping. What is the difference between Web Central and Web Resources, or Analyst Corner and Ask the Expert? You'll have to dig to find out. Alternative means of navigation include an unwieldy table of contents; as the main page already provides an overview of CIO.com's content, a site index might be better for users who

already know what they seek. And I found four different searching system interfaces; it's unclear which one to use when and why so many different versions are needed.

The CIO Web site is architected as a collection of poorly integrated resources. CIO should consult site users to learn more about their information needs and redesign the information architecture to better match those information needs.

*Tell us if you agree with Rosenfeld's assessment at [webbusiness.cio.com/sitereview](http://webbusiness.cio.com/sitereview).*



**Too Much:** Consultant Louis Rosenfeld found CIO's Web site visually overwhelming.

PHOTO BY DWIGHT CENDROWSKI

## Fat and Happy

Anyone greeted at the office each morning by dozens of e-mail messages is familiar with information overload. But now it seems that e-mail takes a toll on the body as well as on the mind. E-mail can make you fat.

In a recent column in *The New York Times*, science writer Jane E. Brody reported that sending e-mail to coworkers for two minutes every hour can add considerable heft to a person's girth. Citing research done by Stanford University professor William Haskell, Brody wrote that sitting at a keyboard flexing an index finger instead of walking around for tête-à-têtes can tip the scale to the tune of 11 pounds over a period of 10 years.

—Megan Santosus



## The End of Distance, the Start of Distance Learning

IDC researchers predict that distance learning will grow **33 percent annually** to reach **2.2 million** students in 2002.



# Heads you win, tails you win.



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## Cracker Jack

**I**T WAS BIG NEWS EARLIER THIS YEAR when the Electronic Frontier Foundation cracked the 56-bit Data Encryption Standard in 22 hours and 15 minutes and the EFF's \$200,000 supercomputer, called Deep Crack, won a \$10,000 prize from RSA Data Security Inc. for the feat.

Perhaps it shouldn't have been.

Alex Fowler, director of Public Affairs for

EFF, says informed sources in his circle report that DES has been cracked in just 15 minutes by the FBI and other intelligence agencies. The FBI naturally isn't talking.

Should CIOs worry about the frailty of DES? John Gilmore, EFF cofounder and leader of the code-cracking project, thinks they should. "Most companies aren't aware of how easy it is to break the 56-bit standard," Gilmore says. "We've proven that a nonprofit group can do it for \$200,000."

The smart thing, says Gilmore, is to upgrade your encryption standard to at least 128-bit. And don't get too comfortable with that standard either: There's a constant arms race between hackers and those who deploy encryption standards.



## ROI by the Yard

The country's largest ISP recently gained some long yardage in a game with the NFL's Baltimore Ravens.

PSINet Inc., headquartered in Herndon, Va., will develop and host the

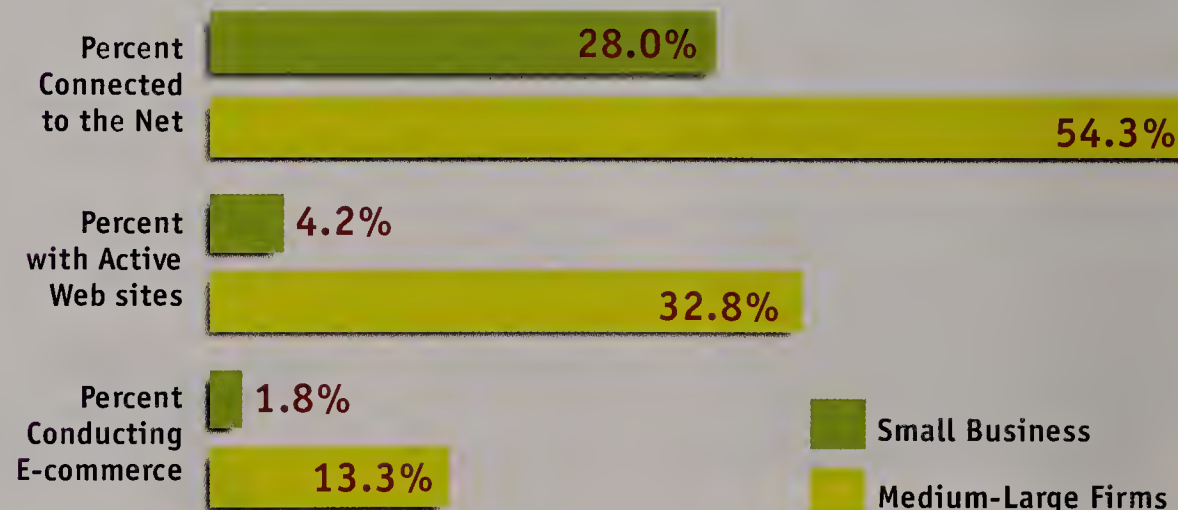
Ravens Web site, [www.balTIMORERAVENS.com](http://www.balTIMORERAVENS.com), and will create [www.ravenszone.net](http://www.ravenszone.net), a Ravens-branded subscribers-only Internet service. Both are scheduled to debut April 17, NFL Draft Day. The Ravens and PSINet kicked off the deal with the purchase of stadium naming rights: Look for PSINet Stadium at Camden Yards in Baltimore. In the home of "Raven" poet Edgar Allan Poe some fans are finding the name less than lyrical. Perhaps the promise of some high-tech toys in the stadium and speedy Internet access will quell the cawing. —*Michelle Neuman*



**NO SURRENDER**  
"I have not given up on encryption."

—FBI Director Louis Freeh, testifying before the Senate Appropriations Committee on Feb. 4.

## Degrees of Connectedness: Small Business vs. Medium-Large Firms



SOURCE: eStats

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## Lifetime Value

Winning the battle online for business means more than just recruiting the most customers, a survey of 100 e-commerce leaders concludes. True victory means keeping those customers true—for life.

That's why most e-commerce sites—93 percent of those questioned in a recent survey by International Data Corp.—have launched aggressive customer-loyalty initiatives. The most popular approach: personalization. About 75 percent offer customized content, products or services.

IDC (a CIO Communications Inc. sister company) says

its research suggests that e-commerce efforts aren't for the faint of heart or light of wallet. On average, survey participants spent nearly \$6 million to build their sites, \$8.6 million annually to promote them and \$4.3 million annually to maintain them.

### Other survey findings:

- Forty-four percent attempted to calculate their online customers' lifetime value, although they don't use a standard formula for doing so.
- Forty percent reported more than \$10 million in e-commerce revenues for 1998.
- Seventeen percent expect online revenues to exceed \$1 billion by 2003.

## Material Gains

**T**HOUGH SHOPPING ONLINE HAS BECOME SEAMLESSLY SIMPLE, businesses that rely on buyers seeing their wares, such as the apparel industry, have been slow to jump on the e-commerce love train. But *www.fashiontrip.com*, an e-commerce project launched in September 1998, pairs a slick Web site with an even slicker CD-ROM to combine judging the quality of merchandise and shopping with friends with the convenience of online buying.

Developed by Los Angeles-based design software pioneer ModaCAD Inc. and Intel Corp., Fashion Trip is aimed squarely at cyberchicks ages 15 to 28.

The Web-enabled CD-ROM opens the doors to a virtual mall where flygirls can shop solo or with friends via text chat or Internet phone for the phattest styles at over 100 of the hippest stores like Esprit, Diesel, Guess Footwear, Levi's Jeans and Nicole Miller. Once inside a store's dressing room, the fashion conscious can create outfits *de tête à pied* using items and accessories from different stores—something they can't do in real life—by selecting the particular article of clothing or accessory from a menu at the side of the screen. They can even try on these ensembles virtually by dragging and dropping them on mannequins customized to their proportions.

Advanced Internet imaging technology allows visitors to zoom in and out, pan around the stores and racks of merchandise and inspect the quality of the garments at high resolutions. Fashion Trip offers its own shopping slave, a visual search engine called Fashion Finder, which combs the stores in search of that perfect white T-shirt and sorts the results by brand, color or product category. Once users have mixed and matched their little hearts out, they simply link to the vendors' Web pages to complete the transaction.

Maurizio Vecchione, president and COO of ModaCAD claims ad click-through rates as high as 22 percent. He attributes this success to the fact that site visitors fit the targeted demographic and are looking for those products flashing across the banner ads when they visit Fashion Trip, which doesn't stop at shopping. Those who dish out the \$39.95 for the CD-ROM online or by calling 800 845-9964 receive the Fashion Trip magazine, the buzz on new music and movies, beauty and fashion advice, TV commercials, fashion videos and links to other fashion-oriented Web sites.

—Meridith Levinson





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## E-Crime Pays

The state of Washington passed the toughest antispam law in the country in June 1998, but so far the main impact of the legislation is not a reduction in spam but an increase in consumer complaints. Before the law was



enacted, the state's consumer protection office received only a handful of spam complaints per month. Since the law went into effect—thanks to plenty of publicity in the Washington media—more than 1,600 Washington residents have lodged complaints with the attorney general against junk e-mail.

State officials are still hopeful that publicity about the law will deter spammers. In October 1998 the attorney general's office filed its first antispam suit. The state's complaint alleges that Jason Heckel of Salem, Ore., sent an e-mail pitch to thou-

sands of Washington residents with a misleading subject line and invalid return address, both violations of Washington's law. Heckel allegedly used the subject line: "Did I get the right e-mail address?" When people brought up the message, they discovered that it was a sales pitch for a \$39.95 electronic booklet called "How to Profit from the Internet."

Heckel still has plenty of time to profit from the Internet. His case is scheduled to come to trial in March 2000.

While state laws like Washington's may deter some spammers, the best medicine, antispam activists insist, is a strong federal prohibition.

"The Internet is global," says John Mozena, cofounder of the lobbying group Coalition Against Unsolicited Commercial E-mail, "and laws in any one jurisdiction are not going to stop it."

## Convergence All Over Again

**A**NOTHER GROUP OF MEDIA MOGULS HAS decided that when it comes to classified advertising on the Web, five pocketbooks are better than one. MediaNews Group, The Hearst Corp., Scripps Co., Advance Publications Inc. and Donrey Media Group formed a consortium to buy AdOne Classified Network Inc. and its Web site, *ClassifiedWarehouse.com*. The new company, headquartered in New York City's Silicon Alley, is called AdOne LLC.

Hearst and Advance are not newcomers to such partnerships; they were among the nine founding members of an ill-fated newspaper industry consortium that folded last year, called New Century Network (NCN; see "That Sinking Feeling," *CIO* Section 2, Nov. 1, 1998). And six other former NCN members—Gannett Co. Inc., Knight Ridder Inc., The New York Times Co., The Times Mirror Co., Tribune Co. and The Washington Post Co.—have already taken the communal road to online classified advertising, joining The McClatchy Co. and Central Newspapers Inc. to form Chicago-based Classified Ventures LLC.

How will AdOne avoid NCN-syndrome—that is, being unable to find a strategy that will satisfy its many partners? Because rather than coming together in search of a business plan, the partners are backing a company that has a plan they like, says Peter Weinberger, executive vice president of Advance Internet Inc. in Jersey City, N.J. The consortium members like the fact that AdOne is an "open" classified network, partnering both with online-only classified ad Web sites and with newspapers.

Newspaper partnerships make sense in the classified ad space because individual newspaper Web sites lack the money, traffic or breadth of ads to compete with nationwide, online-only classified ad competitors such as Monster.com or Carpoint. But Forrester Research Inc. analyst Bill Bass says it is problematic that part of the newspaper industry has lined up behind Classified Ventures and part of the industry has backed AdOne. "You've really got to have some kind of industrywide effort," Bass says, predicting that massive newspaper-industry consolidation is on the horizon. —Sari Kalin







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## Kid Stuff

*At MaMaMedia, IT stands for imagination technology*

BY ANNE STUART

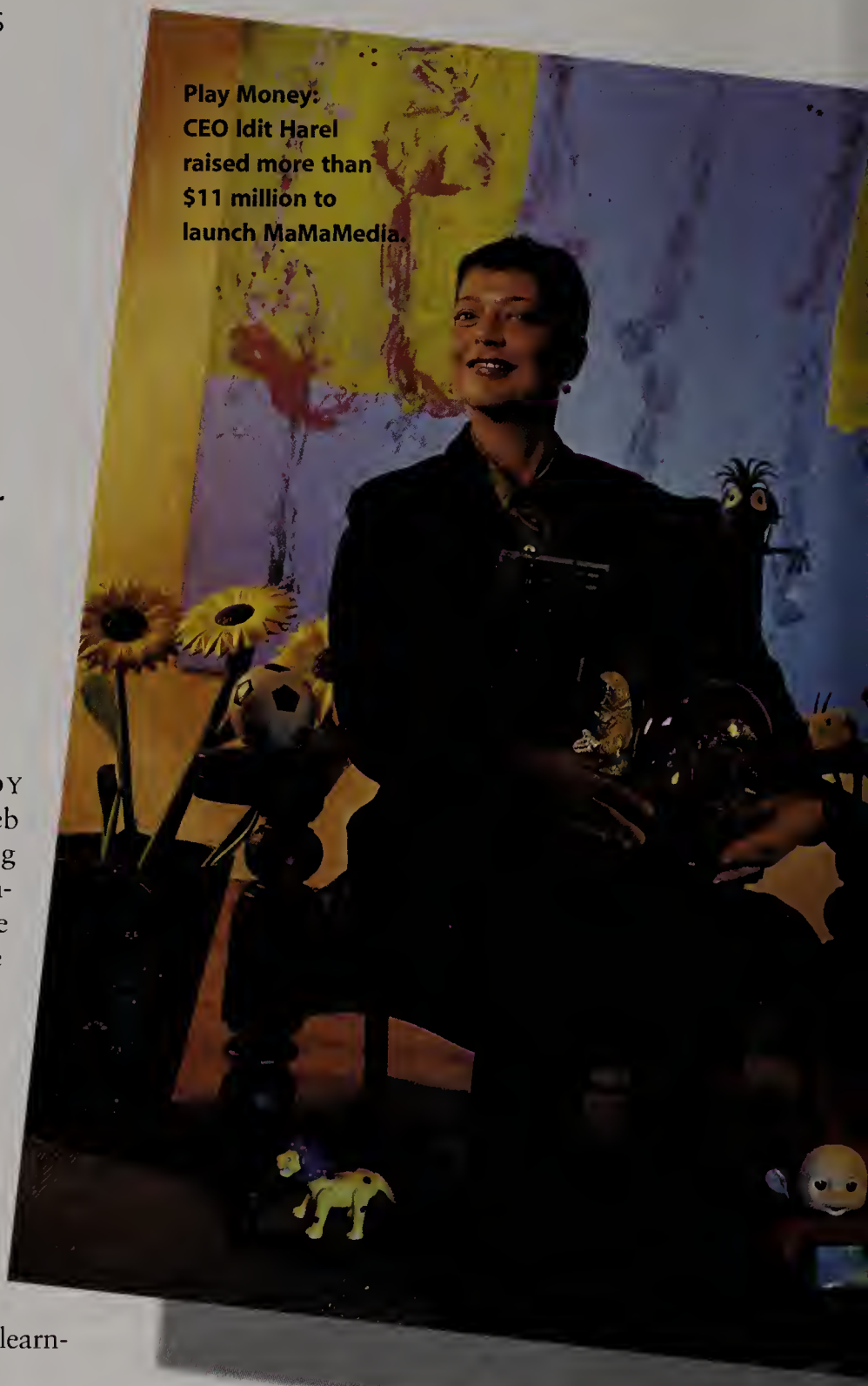
**S**HHHH. DON'T TELL ANYBODY under 13, but there's a kids' Web site that's not only entertaining but—here's the secret part—constructive as well. Rooted in the educational research of the legendary MIT Media Lab, MaMaMedia Inc. offers dozens of free online activities and tools plus content and well-screened links for kids 5 to 12 years old. Youngsters can write online stories, make digital art, create their own animated characters or correspond with those on the site, share their work and safely explore other kid-oriented Web sites. Founder and CEO Idit Harel says it's all about constructive creativity, combining play (the part kids like) with learning (the part parents like).

But MaMaMedia ([www.mamamedia.com](http://www.mamamedia.com)) is also very much about business. Between founding the company in 1995 and launching the site in mid-1997, Harel raised more than \$11 million in private capital. Her company, which began as "just me and my laptop" in a one-room office, has grown to 50 employees; its brightly painted, toy-filled headquarters occupies a full floor of a historic building in Manhattan's trendy SoHo neighborhood. While not expected to turn a profit until sometime in 2001, the company—which could go public soon—is generating revenue from advertising, sponsorships and partnerships, although Harel declines to confirm any figures.

From a business perspective, it's those deals as much as the content that help distinguish MaMaMedia from literally thousands of other kid- and family-oriented sites on the Web. MaMaMedia's current partners include

- Scholastic Inc., which distributes a print spinoff, *MaMaMedia: A Kids' Guide to the Net*, to classrooms and kids' museums nationwide
- Netscape Communications Corp., America Online Inc. and Yahoo Inc., which get MaMaMedia-produced programming for their own kids' Web sites
- General Mills Inc., which promotes MaMaMedia on 20 mil-

**Play Money:**  
CEO Idit Harel  
raised more than  
\$11 million to  
launch MaMaMedia.



lion to 30 million packages of its Betty Crocker Fruit Snacks in exchange for print and online ads

MaMaMedia's potential market is anything but pint-sized. Harel, Forrester Research Inc. and others say 40 million to 42 million American kids will be online at home or at school by 2003, a fourfold increase from 1997. Those same kids already influence \$175 billion in parental spending annually. Given the crowded field, it's unclear how much any one player will be able to reap. Peter Grunwald, whose San Mateo, Calif.-based Grunwald Associates research and consulting firm tracks the children's online market, has said entrepreneurs interested in quick profits stand a better chance with porn or stock-tip sites. But Grunwald adds that sites combining education and entertainment, as

PHOTO BY EDWARD SANTALONE



MaMaMedia does, are most likely to succeed. Initially, MaMaMedia seems to face a serious brand disadvantage from the 800-pound gorillas like Disney, Sesame Street, Mattel and Nickelodeon. After all, is there a kid who doesn't already know Big Bird?

That doesn't worry Harel. "We were born out of the Internet and everything we do is online," as opposed to being a spinoff of a cartoon character or a toy, she says. In addition, she believes the alliances with famous brands like AOL and General Mills will help make MaMaMedia a household name worldwide in a few years. And as Harel sees it, her company's name also combines two well-known brands: "There is nothing more basic or essential to kids than 'Mama,' and it's easy to say in any language," she says; the name's second half, of course, pays homage to the site's Media Lab heritage.

Harel doesn't limit MaMaMedia to the Internet: "It is our core space, but we want to reach kids in multiple media. Making the connection is the goal." So MaMaMedia has developed the 300,000-circulation print magazine, Internet-themed posters, software and other products that extend MaMaMedia's brand so that, like its competitors, it's not available in only one medium.

MaMaMedia seems a natural evolution for Harel, combining as it does her roles as educator, entrepreneur, technologist and mother of three (ages 7 to 18; her youngest participates in all-kid focus groups that test MaMaMedia offerings; her oldest is an office intern). It began when Harel, a petite woman with seemingly endless energy, left her native Israel for graduate study at the School of Education at Harvard University. After receiving two Masters' degrees (one in interactive technologies, one in education and human development), she moved across town to the PhD program

at the Massachusetts Institute of Technology. As one of the first graduates of the MIT Media Lab, she studied with lab cofounder Seymour Papert, renowned for his research on children, learning and technology.

Harel, like Papert, builds on Jean Piaget's theories that play promotes learning. Their work assumes that children learn more by doing than by listening, watching, memorizing and repeating and that kids learn best when they direct the process. Harel says technology can serve as tools for letting kids explore, express themselves and exchange information—activities Harel has nicknamed "the three X's" and which she predicts will be at least as important as the traditional three R's in the increasingly interactive future.

Besides that, MaMaMedia's target market, a technologically astute under-12 audience called the "click-erati" by Harel, increasingly expects creative, highly personalized control. For these kids, "it's not high tech, it's my tech," she says.

Thus, if there's a naughty word at MaMaMedia, it's *passive*. If kids learn best by doing, MaMaMedia's creators reason, they must be able to do as much as possible on the site. "The thing we are promoting is an online experience," Harel says, emphasizing the last word. "The end goal is to make your own. Here is a character we created—create your own. Here are some space-oriented Web sites, go create your own spaceship art."

At MaMaMedia, kids can write their own stories complete with audio and animation, make virtual landscapes or communities by dropping images (buildings, zoo animals, dinosaurs, flying saucers) onto a scene, work puzzles and play games, build and decorate their own spaces or learn about categorization by "collecting" similar items such as shells from groups of unrelated objects. They can display their work in online galleries or save and return to it later. And they can visit 2,000 other kids' Web sites all checked out by MaMaMedia's content team.

MaMaMedia also strives to make sure kids can easily distinguish content from ads and for now offers no chat, e-mail service or forums because of concerns that adults might victimize kids.

Like the youngsters it serves, MaMaMedia occasionally experiences

growing pains, as evidenced by an unscientific panel of kids from three states who, with their parents, tested MaMaMedia on different days. Ten-year-old Anna was unable to access the site, even after her mom contacted MaMaMedia for technical support. Justine, 7, tried to log in twice in one week but wandered off because the home page, rich with audio and animation, took several minutes to load both times. Hayley, 7, enjoyed working on a puzzle but kept trying other activities that simply didn't work. Only Alex, also 7, got online, exploring the site with no problems. "We've got a cable modem and I'm using [Microsoft Internet] Explorer 4.0," says one tester's dad, a Web site developer. "It should be much faster."

Harel says MaMaMedia, like many other dynamic, database-driven Web sites, sometimes suffers from its own success, such as a large jump in registrations and traffic during the school-vacation period when most of the unofficial testers visited the site. Since then, MaMaMedia has upgraded its hardware, adding two new servers and other technology to better satisfy more users.

While ironing out those wrinkles, Harel continues to look ahead to possible new products and services. Among her ideas are distributing MaMaMedia products, Tupperware-like, through home sales, and establishing a system that would allow parents to pay in advance for "allowances," which would work like gift certificates their kids could spend at will on the site. Harel predicts that by 2001 three to five sites will dominate each major Web category—news, sports, entertainment and so forth.

[www.mamamedia.com](http://www.mamamedia.com)

Surviving her category's shakeout, she says, depends on staying ahead of her highly demanding, increasingly technology-fluent audience to keep their interest and their loyalty. "We need to move fast to service these kids," says Harel. "We have to start now to build the brand for kids that aren't even born yet." 

Senior Editor Anne Stuart can be reached at [astuart@cio.com](mailto:astuart@cio.com).



## THE MAIN ATTRACTION

# Self-Serving Sites

*Give your online customers access to account information, and they'll repay you in greater loyalty*

BY SCOTT KIRSNER

**A** GROWING NUMBER OF YOUR CUSTOMERS—BOTH businesses and consumers—live their lives online. Either they're connected all day by a T1 line straight to the desktop, or they dial in every night to check e-mail, plan their next vacations and manage their stock portfolios.

These sorts of customers don't want to conduct business relationships through the mail or over the phone anymore. They want to do it on the Net. Smart companies are granting them their wish by putting customer account information online. In the bargain, these accommodating sites also reap a host of benefits:

- Reduced call-center costs
- Better-quality customer information
- Higher perceived customer-service levels
- Raised switching barriers and increased loyalty

It also makes your Web site a regular destination for customers—finally!

Customers who manage their accounts online “are the highest-value customers we have,” says Susan Sachatello, MCI WorldCom Inc.'s director of online marketing. “Their life [as customers] is much longer, their spending is 50 percent to 75 percent higher and the customer carrying costs are lower. They're the best customers we have.”

In the highly competitive market for residential phone service, Jackson, Miss.-based MCI WorldCom has decided to make the Web a strategic weapon for customer retention and increased profitability. Customers can sign up for new products on the Web,

check their invoices, change their addresses and even find out how many frequent flier miles they've earned through airline copromotions. Those who agree to do all their MCI WorldCom business on the Net—no more paper statements, no more checks in the mail—can even get a discounted rate of 9 cents a minute.

Bringing both new and existing customers online will be a crucial competitive advantage for MCI

WorldCom and any other company that can do it first—and do it right. It takes a process.





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## Don't Overanalyze

In discussions about putting account information and self-service functionality online, there's a strong temptation to build a spreadsheet: How will the benefits outweigh the costs? Resist that temptation. It's still early: Online volume is small relative to phone and mail volume, and no one has been able to quantify exactly how much online service will reduce traditional customer service costs.

"When the business case becomes clearly provable, it's too late to win competitive advantage," says Randy Kahn, president of First Data Direct Banking, a Los Angeles-based division of First Data Corp. that provides an online banking system for over 70 banks. "You have to have a vision that you're going to get more customers as more people get online, you're going to have a 24-hour-a-day relationship with those customers, and you're not going to be paying for an 800 number so that those customers can call you—they pay their ISP to reach you."

Amarillo National Bank in Texas was one of the early adopters of First Data's online banking system, which lets customers pay bills and access account information through a secure Web site. Darren Jenks, the Internet banking coordinator at Amarillo, "dreaded going to budget meetings, because my bottom line was always in the red." But his project, launched in December 1997, has taken off like a rocket. Management projected 400 users by the end of 1998; but "we got 400 in the first two days," says Jenks.

The bank, relatively small with just \$1 billion in assets, won recognition from trade journal Retail Delivery News as the top Internet banking site. It ended 1998 with 4,000 users, growing at 6 percent a month. Jenks believes that with traffic spiking during the lunch hour, customers are saving a visit to their brick-and-mortar branch. He says early indicators show that customer retention is up, and he has his eye on the prize: eliminating expensive paper account statements for a portion of the bank's customers.

"We looked at cost projections before we got into this and did our due diligence," Jenks says, "but with the Internet, to a certain extent, you're

always reaching out of the sky and picking numbers out. No one knows what to expect. You have to play the game, or else you're going to lose market share."

## What Goes Online First?

Building an account service area is an incremental process. "Don't try to do the greatest, bestest Internet site ever," advises Kahn. "Start with something that has real short-term benefits for you and your customers—something concrete. You need to get the organization focused on making it work."

For banks, that means beginning with account information and bill payment. Airlines think about reducing the costs

an office furniture dealer in Phoenix, has given its customers access to order status since its site launched in 1996. Now it's getting fancy. Architects and designers who buy from Goodmans can visit the site to see if they have the latest catalog and pricing from a given manufacturer. "They can determine if theirs is up to date; and if they need a new one, we'll bring one to them," says Adam Goodman, vice president in charge of the Internet initiative. And since Goodmans' headquarters is across the street from the baseball stadium where the Arizona Diamondbacks play, customers can also reserve parking spaces for specific game days through the site,



**People who manage their accounts online tend to be the highest-value customers any business can have. So it only makes sense to do whatever it takes to satisfy them.**

of handling frequent flier inquiries and put mileage statements on the Web. Manufacturers might put order and shipping status online à la Amazon.com and FedEx. Colleges could move the course registration process online. Pharmacies ought to enable doctors and patients to renew and order prescriptions over the Web.

"Every call we get into traditional customer service, we ask whether that's something that could be automated online," says MCI WorldCom's Sachatello. "It follows the 80/20 rule. About 80 percent of the calls can be automated—things like changing a PIN, adding a calling card, updating billing information. Consumers want to do it on their own time, and they don't want to wait on hold."

Companies that have already put basic account information online usually want to get even more sophisticated to hold on to their leading-edge reputation. Goodmans Furniture Inc.,

receiving a printable pass for their dashboards via e-mail.

While that particular offering may lean toward the whimsical, it points to an important trend: providing services—and related content—that customers can't get from traditional channels. NextCard Inc., a Web-based card issuer, lets customers do basic queries on their spending info by date, amount and category—tough to do with a printed statement. What if your utility told you what days and times your electric usage hit a peak and offered suggestions about how to reduce it by using energy-efficient light bulbs and appliances?

Key to any online service endeavor, though, is ensuring the organization will support it by fixing flubs and helping shift customers to the Web. "You need to figure out how online service integrates with the rest of your enterprise, because you're opening up a new channel of communications," says Mark Betz, president and CEO of InCurrent Solutions in



Parsippany, N.J., which helps credit card issuers put account information online. "How will you manage it?"

### Promote It

Once you've launched your offering, it's crucial to let customers know it exists and give them a reason to come.

Goodmans Furniture sent out a milk carton full of Whoppers candy to its customers. Instead of being branded "Whoppers," it featured the Goodmans logo. On the side of the carton was a picture of a Herman Miller chair (a popular purchase among its customers) with the caption: "Have you seen me? For up-to-date information about my whereabouts, visit the Goodmans Web site." Amarillo National Bank purchased billboards and newspaper ads to promote its Internet banking service. While on hold, MCI WorldCom customers hear promos about the Web site.

"There's a window of opportunity wherein businesses can use this tool to

achieve competitive advantage," says Betz. "The window won't be open forever, but it's open now. So you need to let people know what you're doing."

### Keep Moving

First movers know that there are always fast followers. "It's not enough to just put a billing statement online," says Richard Goebel, director of business development at NextCard in San Francisco. "You need to think about how you redefine the way customers interact with you and the experience they have."

E-brokerages and online-only retailers like Amazon.com are generally acknowledged to be the leaders in this space because, as Sachatello puts it, "they have their whole relationship with customers online, and their customers are very concerned with privacy and security, ease of use and quick response." So Sachatello keeps a careful eye on those leaders. She believes that developing better online service and account access is a continuous

learning experience. "The rules are still being written," she says.

The challenges ahead are clear: ensuring that customers can get the same level of service from the Web as they get from other channels (at the very minimum), that those other channels are integrated with the Web (enabling travelers to make plans over the Web, then call an agent from the airport and change their plans) and that the organization fully supports the online efforts.

"The customer is the customer," says Jay Wood, CEO of Manchester, N.H.-based Silknet Software Inc., which makes online e-commerce software. "They want one entity that understands them. [The Web] is going to be the medium for customer service and account management, and you need to be thinking about how you're going to differentiate yourself, how you're going to charge into the lead." **CIO**

*Boston-based writer Scott Kirsner can be reached at kirsner@worldnet.att.net.*

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## BY DESIGN

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## [www.hbo.com](http://www.hbo.com)

### COMPANY

Home Box Office, New York City

### REASON FOR REDESIGN

Hard-to-update home page had limited space for new content and linked to independent subsites.

### DESIGNER

Interactive Bureau LLC,  
New York City

### RESULTS

Template-based design makes site easier to update; schedule on home page is updated four times a day. Organizing content into categories streamlines navigation.

**I**N 1996 HOME BOX OFFICE FIRST LAUNCHED ITS SITE, HBO.COM, around a glittering graphic of Times Square. The graphic, an image map, was attractive but had too little "real estate" for promotional blurbs, says Diane Jakacki, executive producer of hbo.com. Anything that didn't fit was stuck in a long list beneath it. The image map was also hard to update; each week, up to 20 images in the image map needed to be resized and changed to feature new content. And the home page linked to independent subsites, each with its own look and navigation.

For the redesign, Interactive Bureau organized the content into hierarchical categories that can be reached through a navigation bar on the left side of the screen. Templates make content and graphics easier to update, so different programs can be featured throughout the week. Some subsites were grandfathered in and still have the same independent look and navigation they had before the redesign, with just a link back to the hbo.com home page. Ultimately, Jakacki says, the goal is for these subsites to use templates with similar navigation structures.



**HBO'S HOME PAGE** promoted its programs on billboards scattered throughout the Times Square image map. But the image was hard to update and had limited space for content descriptions.



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January 20, 10pm ET/PT  
January 22, 12am ET/PT  
TV14/L,D (AC,AL)

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#### TOP SECTION FITS

a 640 by 480 screen, so users can reach navigation buttons without scrolling. Users can scroll to bottom section to see details on what's inside the site.

#### THE SCHEDULE IS UPDATED

from a database every four hours. The designers scrapped plans for a Java script-based scrolling schedule because it took too long to download.

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#### NAVIGATION BARS CHANGE

position on interior pages, putting the current section on top. That lets users know where they are.

JAVA TICKER FLASHES a series of promotional messages; it packs a lot of content into a small space and can be updated more quickly than the anchor graphic.



# The Powers

*Some CIOs think it's time for corporate America to anoint the Chief Web Officer. We asked six experts if they agreed.*

BY ART JAHNKE

Most companies that are serious about competing in the global market of the next century understand that Web technology—intranets, extranets and the Internet—will play an increasingly important role in the shape of their business strategies. Technological decisions today are not only about what technology to use but how to use it. And the people who make those decisions are no longer simply technologists: They are business leaders and, in the best cases, business visionaries.

Understanding that, and wondering where in the corporate ranks these engineers of tomorrow's business models will come from and where in the corporate hierarchy they will perch, we asked six people with six different perspectives the following question:

**Has the time come for corporations to create a new executive position, one that might be called Chief Web Officer and one that would oversee the strategies of company intranets, extranets and Web sites?**

PHOTO BY FURNALD / GRAY





# That Be

Jeffrey F. Rayport

Director of Marketspace Center  
(a unit of Monitor Co.)  
and Associate Professor (on leave)  
at Harvard Business School



Yes



No



Maybe

There is something quite appealing about a Chief Web Officer loose in corporate America. I imagine a thirtysomething executive with ponytail and black suit (no tie, of course) attending meetings in the staid offices of the chairman in every Fortune 50 company across the land. That individual sports three earrings, a tattoo and a tongue stud—and constantly reminds his or her chronologically challenged colleagues that Generation Y, with a host of new technologies and demands, is on its way.

A lot of established corporations would benefit from this shock to the upper ranks. After all, it's hard enough to get many senior managers to turn on their PCs, let alone take the Web seriously. It seems that nearly every high-powered laptop in the first-class cabins of domestic and international flights these days is being used by senior executives to play solitaire. Clearly there is a role for someone at least to introduce them to other, newer games pre-installed on their hard drives.

But the Web, at the end of the day, is just one manifestation of a broader phenomenon. While it is surely the most ubiquitous of e-commerce platforms, the Web

is one of many enabling technologies that supports companies in doing business through virtual, rather than physical, channels. After all, banks use ATMs and VRUs; catalog retailers use telephone networks and call centers; and fast-food restaurants use kiosks and other automated order-entry systems.

Every one of these interfaces represents a substitution of technology for people in the management of customer relationships. To focus only on the Web misses the point. There is a revolution taking place, but it's not about any one specific technology or software. It's about the opportunities and threats that arise for businesses when machines—instead of people—are used to manage customer relationships.

But that is not to make light of the proposition. The bottom line is that in most businesses the impact of virtual channels on a company's future strategy is enormous, whether on the back-end supply chain or on the front-end consumer interface. In that sense, our chief Web officer is really the person tasked with thinking about how a company should exploit its virtual channels, integrate those with existing physical channels and then determine its overall vision for the enterprise going forward.

In other words, from my perspective, there is already someone in every corporation who bears responsibility for these tasks, if they are the tasks for the Chief Web Officer.

For better or worse, that person is usually called the CEO.



## David J. Farber

Alfred Fitler Moore Professor of Telecommunication Systems at the University of Pennsylvania and nationally esteemed editor of messages sent out over IP, a mailing list that includes 25,000 digerati



Yes



No



Maybe

**T**he traditional CIO is technologically oriented, and the Web introduces another set of issues. There's marketing, which is not a traditional role of the CIO. There's public relations, which is not a traditional CIO role. There's employee relations and human resources issues. Now the marketing people may understand marketing, but they may not understand things like privacy issues or other issues.

That is not to say no one uses the Internet well. Some use it very well internally. Some use it well externally. But very few use it well in all aspects, and that's why you need one person who understands all the issues. It's very complicated, especially for multinationals that may do it well in their home country but will trip over things in other countries. And the Net is always international. Anything you put up has a hundred-odd countries looking at it. You've got to end up offending somebody.

That's one issue. The other is the many things you can do with the Internet. You can use it to get information across, sell, coordinate, and many companies do those things well. I think the one thing that most companies haven't caught on to is how to effectively get image across. They get information across fine. They give you lots of information, but they have no idea where the corporation's head is. It's different from the world of print, where companies often don't transmit information, they transmit image. The Web offers an opportunity to do both, but I haven't seen anybody put them together well. Eventually, I think, image management is going to be the killer app. Someday someone is going to figure out how to advertise on the Web, really advertise on the Web. Some big corporations are doing a very good job, the ones that are doing better have put the management of Web resources there. For that, you need to have a Web officer.

## Ira Magaziner

President of SJS Inc., a business strategy consultancy based in Quincy, Mass., and former senior adviser to the President of the United States for policy development



Yes



No



Maybe

**T**he Industrial Revolution brought a fundamental change in the products companies produced, the way they organized their work, the way they served their customers. Some companies transformed themselves using the new technologies—electricity, motors, steel. Most did not. They clung to their old ways of doing business and were supplanted by new companies that formed around the new technologies.

We are going through a similar revolutionary period today with one exception. The ability to communicate and process information at high speeds and the linking of the people of the world through the Internet will transform the world economy as did the Industrial Revolution. The major difference is that today the changes are occurring much more rapidly. Companies must adapt quickly or find themselves at a serious competitive disadvantage. Many companies will need to rethink their product development strategies to build in the capability of interacting with the networks. Companies will want to network their R&D centers around the world. Tremendous productivity improvements will come to those who

reorganize their work processes to do supply chain management and customer service via the Internet. Where the Industrial Revolution reduced the direct costs of producing a product—labor and materials—the information revolution will allow a significant reduction in overhead and transaction costs. And in most companies these make up well over half the total costs.

Companies will also increasingly sell their products and services electronically. That will require radically different strategies for marketing and advertising. It will also require establishing systems that differ significantly from those used today for order fulfillment, billing and customer service.

In traditional industrial organizations, the managers of manufacturing, sales, logistics, marketing or customer support provided the day-to-day leadership that allowed the companies to succeed. In the new Information Age, the success of their jobs will depend to an increasing degree on how well a company runs its Web activities.

Those companies

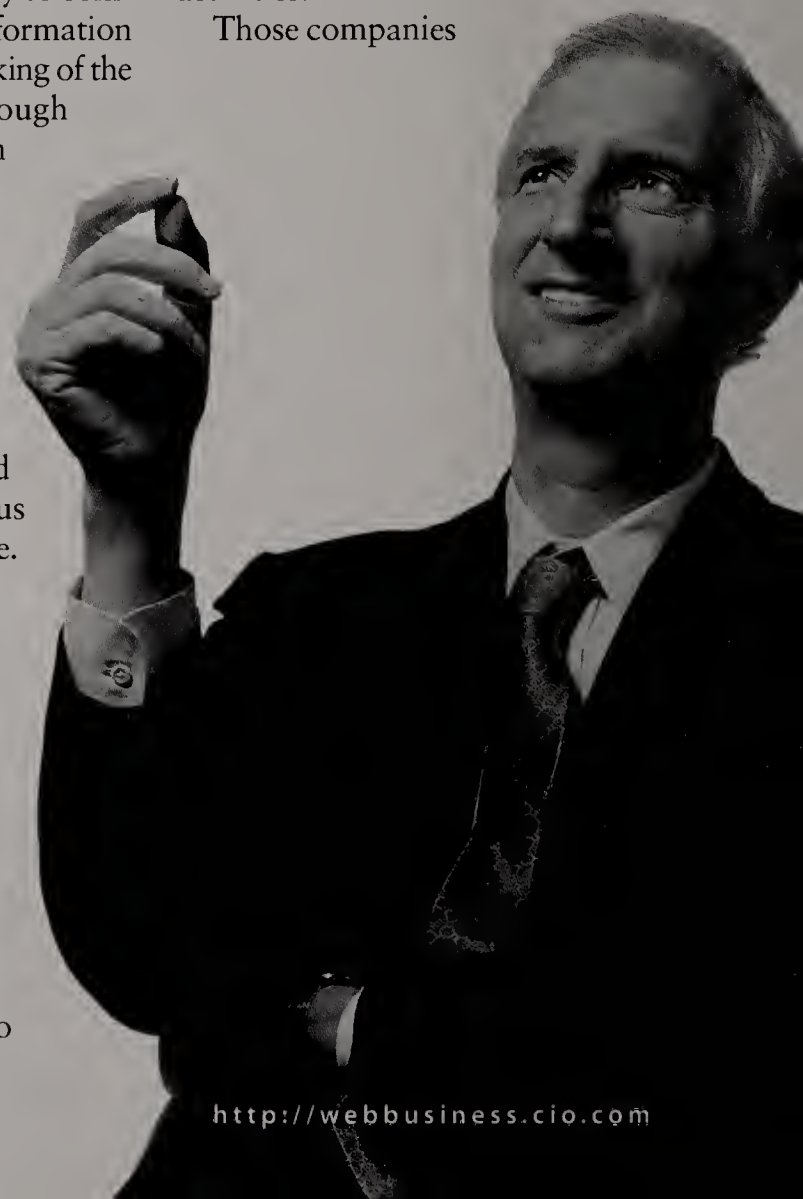


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## COVER STORY: EXECUTIVE OFFICES

that are serious about making a successful transition to the Information Age will need to create a senior-level position to coordinate all Web-based activities and to put resources, both people and capital, into his or her organization. Traditional IT organizations are often not flexible or innovative enough and often do not have sufficient status in a company to perform

the kinds of functions successful Internet use requires: Skillful people who are both good managers and Web-savvy are few in number.

As more companies understand the importance of the Internet and electronic commerce to their businesses, there will be far more demand for these good Web managers than supply.

The competition is likely to resemble

the free agent market in professional sports. Smart companies will elevate the status of Web coordinator within their companies, will pay well and will try to use a mix of stock options, perks and long-term contracts to tie the really good Web managers to their company. Those companies that move too slowly will find themselves at a serious competitive disadvantage.

### Victor Kiam

Chairman of, and legendary pitchman for,  
Remington Products Co. LLC,  
manufacturer of electric  
shavers for men and women



Yes



No



Maybe

**I** think for some companies creating an executive position to oversee Web technology makes a hell of a lot of sense. For other companies, at least for the moment, the Internet is a relatively minor area. Let me make a comparison. Twenty years ago most companies didn't have an MIS officer. Then it became universal in any company of any size, because they realized that they needed someone to manage information flow. That is what is going to happen here. Right now, the Web officer may report to the MIS person, or he may report to the marketing person. Where that chain of command goes ultimately will depend on what you want to use your Web site for. But whoever reports to whom, the marketing department will have a lot to say.

Remington has a Web site, but so far we have not promoted direct sales over the Web. Instead, we have 800 numbers that people can call. We also have a travel appliance business called SmartTravel, and there we are trying to make more use of the Web. We are trying to align our Web site with the Web sites of companies in the travel business. We know that people are

booking their vacations on the Internet at travel sites, sites like American Airlines Inc. or Carnival Cruise Lines, and we want to be linked to them. If you're going on a trip with Carnival Lines, you may need luggage, and we want to be right there.

We are still working things out, and we are trying to figure out how to sell online and still give our partners a percentage without it costing a fortune. It's tough because people can go home and order a product and you don't know where the lead is coming from, and the travel sites are not just going to give us the link for nothing. The same thing happens in stores. That's the reason we have held up on selling Remington products online. We are discussing this with our retailers because if we suck customers away from them they aren't so happy. We are really tiptoeing.

Right now at Remington we are using the Web site primarily as an educational tool, although it will certainly become a sales area. Things are changing. If you look back over the business of electric shavers you see something interesting. Here is an item with a lot of features that the customer wants to know about: 'Is it cordless? Is it rechargeable?' Twenty years ago you had personal salespeople in stores to answer those questions. You would go to Macy's, and someone there knew everything about shavers. That has changed, and when that changed, we tried to make our package our sales tool. Right on the box we describe the product and its competi-

tive advantages. But all that information that we put on the box you can now put on a Web site. That's the next phase. It will happen. The number of people using the Web is increasing every day.

In the big picture, what's happened is that we went through a couple of hundred years of man's extension of his physical



power through the Industrial Revolution. Now we are going through the extension of his brain power, and the scope of that is great. Of course, we don't know what will happen. You know when you work in electric shavers and you work like hell to find something new, and this is all new. This field is just exploding. It's very exciting.



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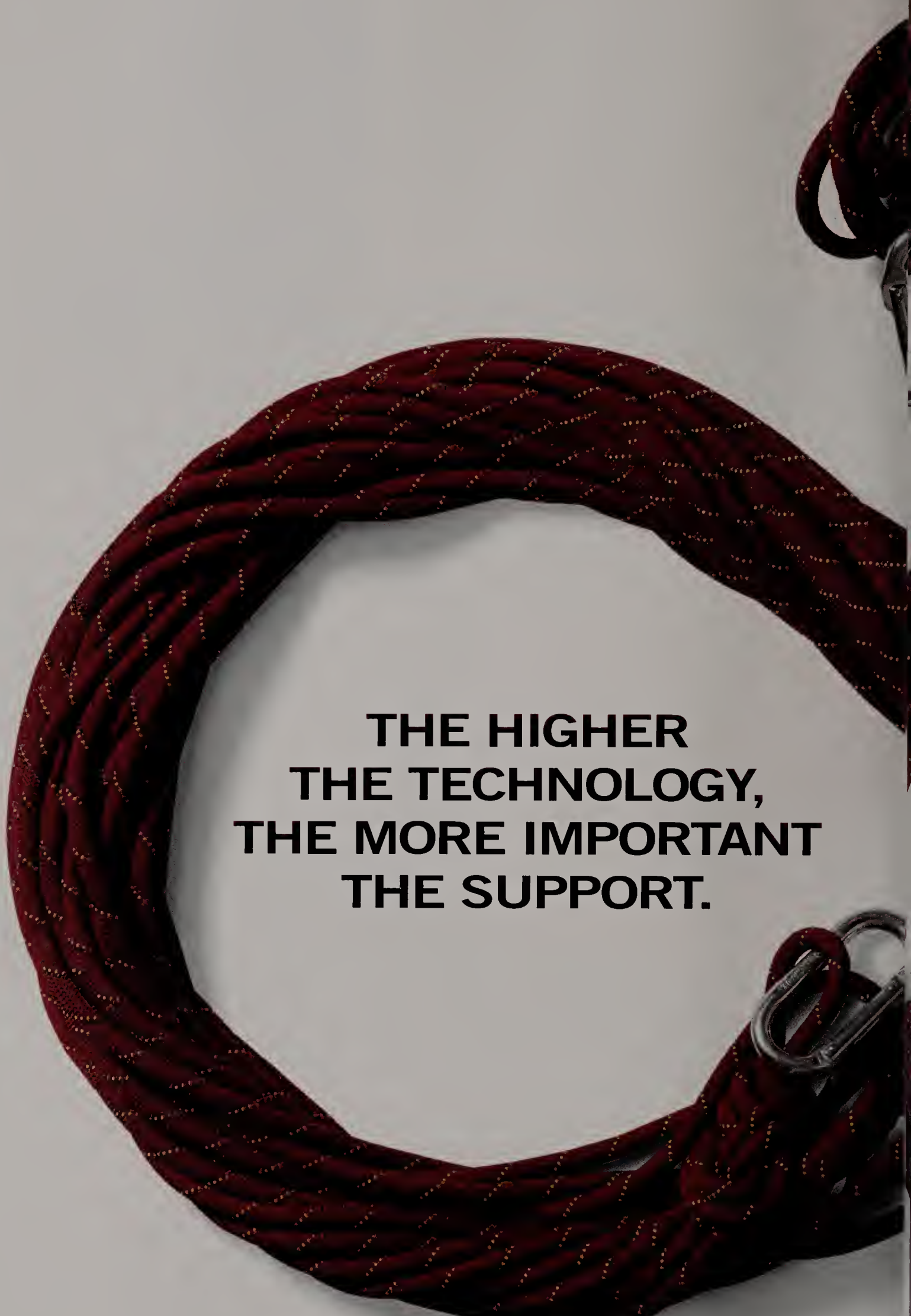
|                  |                                                                                                                                                  |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
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| Job Description: | Work with companies to facilitate euro conversion.                                                                                               |
| Experience:      | Determined the impact of the euro on cross-border pricing and distribution channels for a Japanese manufacturer, thus minimizing profit erosion. |
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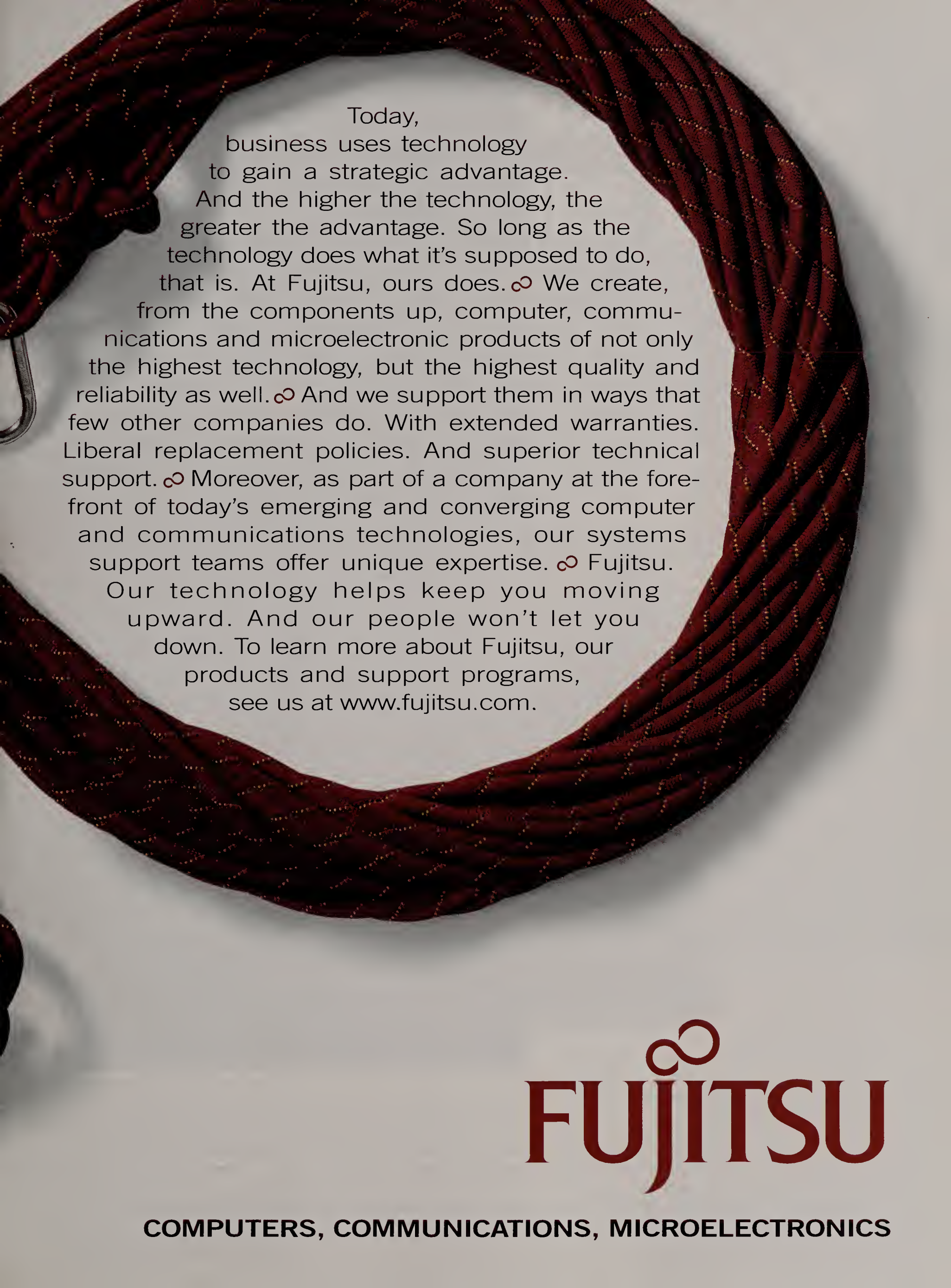
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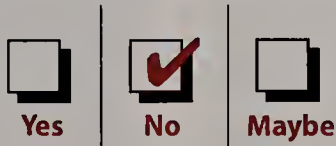
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## Sherman Woo

Senior Director of US West Inc., the \$11 billion Regional Bell Operating Company based in Denver, and main architect of the company's landmark Global Village intranet, which connects 40,000 employees



Creating a new position is not a good idea. The problem is Web technology by itself will not transform a business. You must transform your business to avail yourself of the advantages the technology enables. From a practical organizational view, every aspect of your organization must redefine itself to achieve the desired outcome. I believe that is easier to do if the existing leadership develops a transformation strategy using a team approach rather than introducing a new political entity that would have to develop new relationships with existing business units.

The value of an intranet is that it enables an enterprise to quickly develop new connections, expands its capacity to absorb more information and allows it to coordinate distributed activities.

Intranets are more about corporate culture and collaborative management than about technology—you can buy an exercise machine, but you can't get a new body without using it.

Business will have to master the Internet to survive. It has become a significant marketplace. Again, what is required is a remapping of how a business is organized to provide product and services to its customers. That is difficult work



## Philip Anderson

Associate Professor of Business Administration  
Amos Tuck School, Dartmouth College



think not. General managers are tasked with creating value, and increasingly this can be done only via intranets, extranets and Web sites. Hence, Web strategy is becoming inseparable from business and corporate strategy, which are the province of line managers. Senior managers are paid to set aggressive (yet realistic) performance standards, help their subordinates achieve them and reward accomplishment. CEOs should set the bar high so that in order to clear it, subordinate general managers are led to leverage knowledge, streamline supply chains, build customer loyalty and generate new revenue streams. Making effective use of the Web for such purposes is a general management problem, not a staff problem. Creating a Chief Web Officer who oversees Web strategies makes the Web a staff problem.

Anointing a Chief Web Officer may seem attractive for political reasons.

Many CEOs and CIOs complain that their IS shops are resisting instead of enabling the transition to the Web as strategic platform of choice. Telling managers to get help with their Web strategies from people who feel threatened by the Web seems like a recipe for chaos, so why not create a new position to help managers bypass traditional IS? If we rename the CIO the Chief Web Officer, we identify the executive with a technology, not a function. We don't have Chief Telephony Officers, though most of our businesses would collapse in an hour without phones. The CIO is the senior staff executive who oversees the firm's architecture for creating value from information. Overseeing all things involving the Web is only part of that charter. If we appoint a CIO and a Chief Web Officer side by side, we signal that IS isn't concerned with the Web and vice versa. We also set up a guaranteed competition between two executives that can only sap the time and effectiveness of both.

De facto, the marketplace is working out a solution to political resistance. General managers whose IS departments can't or won't support value creation via the Web are turning to consultants. The Chief Web Officer is whoever helps the general manager use the Web strategically. A CIO who isn't viewed by line managers as the Chief Web Officer will be replaced in all but name by a vendor who can help those managers meet their performance targets.

involving embedded systems of software and people. The folks that know what pieces to move first and next are already on the job. If they are not a part of the solution, they will be a big part of the problem. **CIO**

Senior Editor Art Jahnke can be reached at [ajahnke@cio.com](mailto:ajahnke@cio.com).



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# Mazed and Confused

*A bad design can cost a Web site 40 percent of repeat traffic. A good design can keep them coming back. A few tests can make the difference.*

BY SARI KALIN

## THE CEO WANTS TO KNOW HOW YOUR WEB SITE IS DOING.

So you ask the Web jockeys to pull the latest stats. Hits are growing. Page turns per visit are up. The search button has been getting lots of action too. But before you pass those numbers on to the CEO, think again: The search button's popularity could be a sign that customers can't tell where the site's navigation buttons will take them. Those hits and page turns could be a sign that customers are lost, testing link after link. You don't know because at your company, as at most companies, no one has ever asked customers whether your Web site is easy to use. And what you don't know can cost you.

Cambridge, Mass.-based Forrester Research Inc. estimates that Fortune 1000 companies shell out an average of \$1.5 million to \$2.1 million per year on site redesigns without knowing whether the redesign actually made the site easier to use. Convolutd e-commerce sites can lose up to half of their potential sales if customers can't find merchandise, according to Forrester. Hard-to-use content sites can turn off up to 40 percent of return visitors, and those losses add up quickly. On a corporate intranet, poor usability means poor employee productivity; usability guru Jakob Nielsen estimates that any investment in making an intranet easier to use can pay off by a factor of 10 or more, especially at large companies. (For a closer look at the kind of gains Nortel has reaped from improving its intranet usabil-

### Reader ROI

IN THIS STORY, READERS WILL LEARN

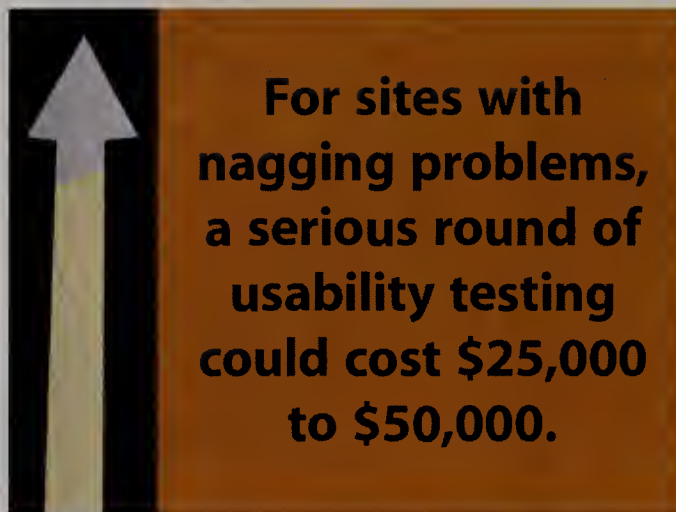
- ▶ How much money a confusing Web site wastes
- ▶ The cost of making your site easier to use
- ▶ Whether you should hire outside expertise or do it yourself



## USABILITY

ity, see "You Think Tomaytoes, I Think Tomahtoes," Page 46.)

And if you think that finding your way around your Web site is a no-brainer, think again. Research by North Andover, Mass.-based User Interface Engineering Inc. (UIE) shows that people cannot find the information they are seeking on a Web site about 60 percent of the time. (For more of UIE's findings, see "Four Web Site Hurdles That Can Stop Users in Their Tracks," below.) Users can run into trouble even at a well-designed, well-financed site, says UIE's founder Jared Spool. On Disney.com, for example, when UIE asks users to find the hotel closest to the monorail at Disney World, about 20 percent get lost in Disneyland and don't even know it. "If one in five people who came to the theme parks got lost," Spool says, "Disney would fix it." Disney Online's Senior Vice President and General Manager Ken Goldstein notes that Disney Online is already committed to developing an easy-to-use Internet design. While Disney Online did not have anything to do with Spool's tests, Goldstein is interested in his findings. "As the next generation of Disney.com evolves," Goldstein says, "we will continue to respond to customer input through our own usability testing."



Without a doubt, as Web markets become increasingly competitive, Web site ease of use will become a way to stand out from the crowd. This story looks at two companies going to great lengths to make their sites easy to use, revealing what they do to get customer feedback throughout the design process, how they measure their progress and what kind of time and money your company may need to spend to get similar results.

### What Users Can Teach You

Mark Thompson's new corner office on the 17th floor has an enviable view of San Francisco Bay. But Thompson pays much more attention to his office television set than to its floor-to-ceiling windows. That's because Thompson is the newly appointed senior vice president of customer experience at Charles Schwab & Co. Inc., and his television is usually tuned to videos of customers clicking their way through new versions of Schwab's Web site, videos recorded at Schwab's in-house usability testing lab. "We want to understand what the customer needs at the most intimate level," Thompson says. "Usability is one of our secret weapons."

The secret weapon appears to be working. Schwab's main Web site for U.S. investors, [www.schwab.com](http://www.schwab.com), handles more than \$7 billion in securities transactions a week, with more than 2 million active customer accounts holding \$174 billion in assets. With those numbers, one might wonder why Schwab would need to make any changes to its Web site at all. But Schwab knows it cannot afford to coast; as more and more newcomers get online, and the competition for their dollars increases, more e-commerce sites are making ease of use a differentiator. "A year ago, it was a rush to put up applications and functionality," Thompson says. "It's now a rush to be useful."

Schwab set up its usability lab in 1995 to test its desktop software products; it now uses the lab to test all Web products. Thompson won't talk about how much the lab cost or how much Schwab spends on testing each year (it does not break out any aspect of its IT budget). But Schwab has clearly invested significant resources. Customers and noncustomers come to the lab for one-on-one usability tests three days a week. In half the lab, a user sits at a computer monitor and tests new site features, while remote-controlled video cameras record his or her facial expressions and computer screen; in the other half of the lab behind a mirror developers can watch the tests and see what works. Abbott Usability, a San Jose, Calif.-based usability testing firm, recruits Schwab's test takers, runs the tests in Schwab's lab and reports on the findings.

Schwab runs tests on paper prototypes in the early phases of design and later on HTML prototypes. In one recent paper test of an e-mail alert prototype, the test facilitator sat with a trim, navy-blazer-wearing architect who admit-

### Four Web Site Hurdles That Can Stop Users in Their Tracks

- 1 Too much reliance on searching.** If people come to your site and don't hit the search button, they are 50 percent more likely to find information than if they did hit the search button.
- 2 Too short or too long links.** Links that are 7 to 11 words long are most likely to get users to their target.
- 3 Too many clicks.** Users' success at finding their target drops off sharply after four clicks. Designing sites with fewer, longer pages is a better strategy than designing sites with more short pages.
- 4 Too much white space.** When there's lots of white space on the pages in a site, users are less likely to find the information they are looking for. They also claim the site is more complex, harder to use and over-complicated.



SOURCE: USER INTERFACE ENGINEERING, NORTH ANDOVER, MASS. BASED ON USABILITY TESTS OF POPULAR WEB SITES WITH 165 USERS IN 1997 AND 1998.





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## The Price of Right

### Quick Fixes: 3 to 6 weeks, \$8,500 to \$17,000

| PROBLEM                      | SOLUTION                                  | COST               |
|------------------------------|-------------------------------------------|--------------------|
| Site navigation not reliable | Run quality check and repair bad links    | \$1,900 to \$3,700 |
| Button text illegible        | Fix text or replace buttons               | \$1,200 to \$2,000 |
| Body text illegible          | Enlarge type                              | \$3,000 to \$7,500 |
| Words are inconsistent       | Replace inconsistent commands and prompts | \$1,200 to \$1,900 |
| Text is jargon               | Replace jargon                            | \$1,200 to \$1,900 |

### Rehabilitation: 10 to 26 weeks, \$35,000 to \$90,000

| PROBLEM                          | SOLUTION                                        | COST                 |
|----------------------------------|-------------------------------------------------|----------------------|
| Performs inconsistently          | Shrink or cut animation and irrelevant graphics | \$2,000 to \$6,000   |
| Content not at 2nd or 3rd levels | Combine menus to reduce number of levels        | \$14,000 to \$37,000 |
| Inconsistent controls            | Replace inconsistent buttons and toolbars       | \$5,500 to \$10,000  |
| Navigation elements hidden       | Visually identify all clickable elements        | \$5,000 to \$12,000  |
| Irrelevant content               | Eliminate off-target features                   | \$8,500 to \$25,000  |

### Tear down: 24 to 39 weeks, \$780,000 to \$1.56 million

| PROBLEM                                                                    | SOLUTION                                                                                        | COST                   |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------|
| Not organized by user goals                                                | Re-architect site structure and content                                                         | \$130,000 to \$200,000 |
| Information incomplete                                                     | Audit content catalog and build new content                                                     | \$350,000 to \$935,000 |
| Site does not offer transactions, interactivity, personalization or search | Add transactions, dealer locators, interactivity, customer profiles, recommendations and search | \$300,000 to \$425,000 |

SOURCE: FORRESTER RESEARCH INC., CAMBRIDGE, MASS., WHY MOST WEB SITES FAIL, SEPTEMBER 1998

ted to being a tough critic. He was stumped by a question that would seem simple to any Web developer: "What kind of e-mail system do you have?" The form required him to identify his system by checking one box on one of two lists, one for HTML e-mail systems and one for non-HTML-based systems. When he said he would have checked boxes on *both* lists—"don't know" under HTML mail and "AOL" under non-HTML mail—the test observers on the other side of the mirror gave knowing sighs; he was not the first user to have this problem. Lesson learned: Schwab developers later decided to scrap that question and instead to determine from the back end whether users have HTML or non-HTML mail.

Customer feedback has also played a major role in Schwab's customer center redesign project, which was in development at this writing and expected to launch later in spring 1999. Like many Web sites, the customer center was initially designed with a navigation bar on the left-hand side of the page and more navigation options at the top. Customers pointed out that even though they could use the site there were just too many places to look for navigation. In response, Schwab's redesign puts all the navigation tabs at the top of the page. "You're constantly breaking what works and coming up with something new because the customer is coaching you through

the process," Thompson says. "Unless [the customer is] there telling us, it wouldn't happen."

## No Lab, No Time, No Money? No Problem

High-end testing like Schwab's is great if you can afford it, but a company doesn't need fancy tools to make a serious commitment to ease of use. At Healtheon, a startup that develops Internet-based health-care applications, the usability lab initially consisted of a tiny storeroom with a leftover cubicle partition propped up between two tables. The designers used the makeshift lab to test 100 users during the five-month development of Benefits Central, a Web-based application that lets employees sign up for benefits. Since the application would be used once or twice a year at most, ease of use was paramount, says Bruce Tognazzini, an interface designer at Healtheon. When Tognazzini's team first started testing, only 15 percent of users could make it through successfully; when he finished testing and tweaking the product, all users were successful. Without usability testing, Tognazzini would never have known that novice users would be stumped by the very first step of the application—maximizing the size of a new browser window—or



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that power users would get confused by the instructions designed to make it easier for novices.

Companies that skip user testing often give the excuse that they don't have the time, Tognazzini and others say. But a company can get valuable information from testing as few as six users over a few days, if the users are from one customer group (for example, midsize distributors, field sales staff, novice Web users). A bigger problem at most companies, says Nielsen, is that there's no one on staff who recognizes the importance of ease of use or makes the user experience a priority. Nielsen recommends that every project have a user advocate, someone whose mission at every meeting is to say, "Remember the customer." For a large project, that can be a full-time role. For a smaller project, the role can be added to the duties of someone in marketing or IT. The advocate should ensure that some usability testing is done and keep track of the data to guide the next redesign. When working with an outside design firm, the advocate can see that usability milestones are added to the contract and met.

How much does it cost to make your site easier to use? Forrester has parsed out the costs of various degrees of Web site problems and fixes (see "The Price of Right," Page 42). A basic site design review by a user-experience professional can cost \$5,000 to \$10,000; for many sites, according to Harley Manning, Forrester senior analyst, that will be enough to uncover major flaws that obstruct good usability, such as having too many levels of information. For sites that still have nagging usability problems, a more serious round of usability testing could cost \$25,000 to \$50,000. At UIE, Spool says he has had engagements run up to \$250,000; for that price, UIE runs field studies, works intensely with the site design team and tests a variety of alternatives. Usually that kind of treatment is for a company facing significant competition, maybe number two in its market and pressing to become number one.

If paying for outside help is outside your budget, it is possible to train in-house staff to do a self-diagnosis of major usability flaws and to conduct user tests. Spool, Nielsen and others run seminars on usability testing, and books treat the subject. Yet Forrester's Manning says that companies that are serious about full-blown usability tests may still want to go outside since insiders may be too close to their own Web sites or the company organization to do an objective job of testing.

### Know Your Customer

Traditionally, usability tests are run at the later stages of a project, when designers have mocked up an interface on paper or have developed a prototype. But long before that stage, a company must first figure out who its Web

customers are and what they need—not always an easy task. A typical corporate Web site may be trying to serve investors or job seekers or even have a commerce component. "There are a variety of character types that come to the same Web site for different intents," says Karen Holtzblatt, president of InContext Enterprises Inc. in Harvard, Mass. "If you don't

start thinking about what your real [customer] intents are...you are going to end up designing this overcomplicated, too flashy thing."

Holtzblatt's answer to this problem is a process she calls "contextual design"—basically, watching users at work in their offices, performing both Web and non-Web tasks, and then designing the site to meet those needs. One of her clients, New York City-based publisher and information provider RIA Group, is using the technique to help redesign a Web site aimed at finance professionals. To learn about her customers in context, Shelley Wood,

RIA Group's director of business development, has spent hours in financial executives' offices watching them work; at a recent visit to a bank CFO's office in New York City, for example, Wood watched him searching for information on competitors. The CFO was surrounded by what appeared to be haphazard stacks of papers. But the stacks were organized by topic within his industry, and they contained pages of Web site printouts. That suggests that the Web site may need similar organization, and printing information from the site should be easy. These insights will guide the redesign, Wood says; RIA group will run traditional usability tests when it has a prototype ready.

When interviewing users, it's important to ask them questions about not only what content they need now but what content they might need in the future. That way, the site's information architecture can be designed to accommodate it, says Louis Rosenfeld, president of Ann Arbor, Mich.-based Argus Associates Inc. and co-author of *Information Architecture for the World Wide Web* (O'Reilly & Assoc. Inc., 1998). (For Rosenfeld's critique of CIO's Web site, see "CIO.com: Warts and All" in Threads, Page 12.) It's also important to ask users about content in a technology-independent way, he says. "Don't ask them, 'What can a Web site do for you,' because they don't know what a Web site is technically capable of," he says. "It's more important to ask, 'What kind of information would you like?'"

When it comes to making your site easier to use, starting small is better than not starting at all. Ask yourself this question: How many users did you talk to last month? "If the answer is none, one is going to be a dramatic improvement," UIE's Spool says. "Two is even better, and three will start to show you trends." **CIO**

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For more details on Healtheon's testing travails, linking to an article on the topic, and links to articles and books on Web site usability and other resources, see [www.cio.com/archive/webbusiness/040199\\_use.html](http://www.cio.com/archive/webbusiness/040199_use.html).





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# You Think Tomatoes, I Think Tomatoes

To build a model intranet, Bay Networks spent \$3 million and two years studying the different ways people think about the same thing. The result: They all think alike about the \$10 million saved each year.

BY PETER FABRIS

**D**ALE MEAD LOOKED OVER 23,000 PAGES OF DOCUMENTS in the Bay Networks database. There were product specs, price sheets, sales presentations, competitive intelligence reports, white papers, press releases, news stories and dozens of other kinds of information. And they were, in Mead's mind, a mess. For Mead, who in June 1997 had just accepted a job as a knowledge architect at Bay Networks, a computer networking hardware and software company based in Santa Clara, Calif., that was the good news. Mead liked a challenge, and he liked to organize things. He loved figuring out why different people thought of the same thing in different ways and how their relationships colored their thinking.

At Bay Networks, Mead's challenge was twofold. First, he had to understand how some 7,000 employees thought about each particle in the ocean of information that was swelling the company's database. Then he had to decide how to package it, slicing and dicing and referencing and cross-referencing so that most people could find more stuff with less effort most of the time. Mead had been itching for such a project for years. A former reference librarian and researcher in Apple Computer Inc.'s advanced technology group, he relished the chance to pioneer a Web-based knowledge management system. "I'm a knowledge addict," Mead says. "As a kid, I used to read the

## Reader ROI

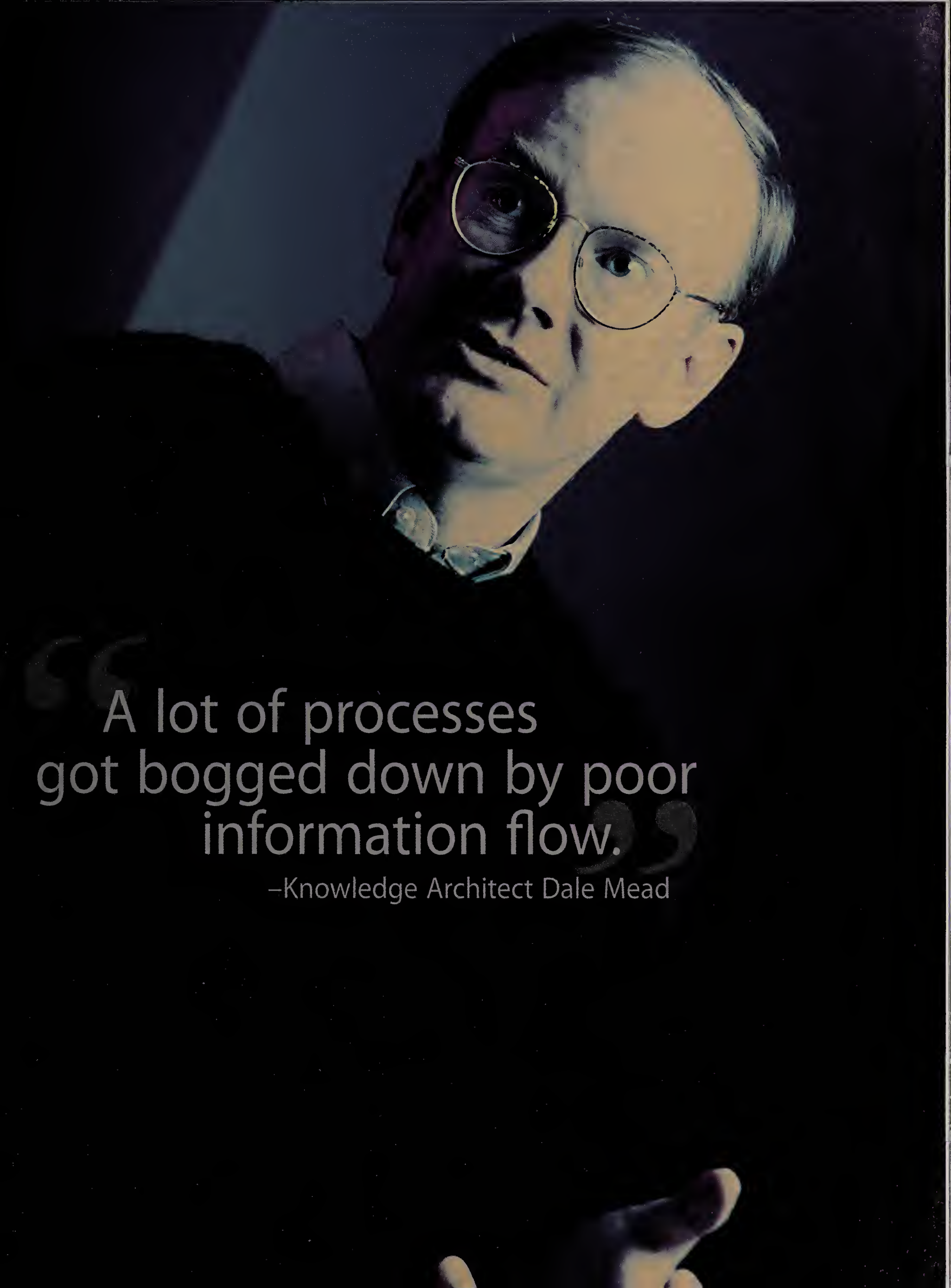
BUILDING AN INTRANET REQUIRES getting a firm grip on how users think about information. Readers will learn how to

- ▶ Analyze what users want
- ▶ Deliver information the way users want it



PHOTO BY JOHN HARDING





A lot of processes  
got bogged down by poor  
information flow.

—Knowledge Architect Dale Mead



## KNOWLEDGE MANAGEMENT

encyclopedia cover to cover. When I found out that [Bay] was thinking along the same lines and had secured funding, I said 'Yeah, let's go!'"

At that time, just two years ago, Mead thought it unusual to find a company deeply committed to building a corporate intranet, and Bay Networks appeared to be *very* deeply committed. Today, when many companies are thinking about where to start, Bay, along with its new parent company Nortel Networks, has something called the Information Management and Delivery System (IMDS), a \$3 million effort that connects 7,000 users to 3.8GB of data, organizes 23,000 documents housed on 2,800 separate home pages and promises to reduce product cycle times by 10 percent. Company officials estimate that each member of the sales staff will save a minimum of two minutes a day searching for documents—time that translates into \$10 million a year. IMDS helps engineers test products faster, and it helps a great many people at Bay Networks do their jobs more efficiently. Within the networking industry, the Bay Networks/Nortel intranet is seen as a model of knowledge management. Inside Nortel, it is seen as a monumental effort with a big payoff.

In the pre-IMDS days, Bay employees suffered from information overload. Overflowing e-mail boxes, stuffed voice mail systems and the Web were stealing time from more productive efforts.

"We were a mess," says Steve Larsen, senior manager of knowledge systems architecture and strategies for Nortel Networks Inc. Many people in marketing had their own home pages on which they posted such things as news articles about the competition. While users loved having such documents posted online, without a central search mechanism they had a devil of a time finding what they needed.

Lisa Guess, director of systems engineering, says she spent a couple of hours a week searching for documents such as price lists, technical briefs and sales pitches for products. So did many of her colleagues. In order to find a document, Guess had to know which department put it out. Sometimes, because departments are organized around product lines, it was next to impossible for Guess to find what she needed. A white paper that explained how data transmission can be prioritized on a network, for example, would be associated with several products and could be housed under any of several departments' sites. Once or twice a week, Guess would have to call someone in another department to find documents. Finding what she needed, Guess says, was like searching through random stacks of books to find a particular volume.



In early 1995 Larsen proposed to upper management that the company try to clean up the mess by linking the many islands of information together under one system. At the time, the likely way to do that was with Lotus Notes or other groupware systems, a prospect that didn't thrill the people at Bay Networks because systems like those restricted the way documents were linked. "We didn't want the application to dictate how people work," explains Bay Networks CIO Jorge Taborga. The company hoped to encourage people to continue posting useful information on their own departments' home pages, something impossible with groupware that required everyone to place information on the groupware itself. New groupware would also require extensive training, something no one was up for. So Larsen's proposal went on the back burner.

Just over a year later, in spring 1996, Larsen was back with a new plan, one that won the support of Michael Fox, vice president of knowledge systems. Instead of relying on groupware, Larsen wanted to use a new technology, dynamic HTML, that promised to allow a Web browser to compile documents on the fly. With dynamic HTML, programmers

PHOTO BY JOHN HARDING



# We didn't want an application to dictate how people work,

—CIO Jorge Taborga

simply create templates that automate how information is presented online. When a user searches for, say, white papers for the Accelar family of data switches, the system would compile the list from components. Programmers would not have to create a page that lists all the white papers, a convenience that could save untold hours of grunt work. The technology looked promising. But the knowledge management architecture would not be so easily procured. It would have to be built from the inside out.

Mead joined the project in June and wasted no time before digging into how information was used at Bay. He studied reference books such as the *Predicast Revised Event Code & Event Name List*, a reader's guide to the business press, for insight into how people look for information. He found that the directory indexed articles by three categories: product, industry and activity. An article on a WAN implementation, for instance, would be indexed under computer networking, high technology and information systems. Mead decided that Predicast was a good model for IMDS because Bay's documents would also fall in multiple categories.

Mead also learned that most business indexes classify business by function: manufacturing, marketing, sales, finance and so forth. But that traditional way of organizing information alone wouldn't be suitable for Bay. The company's product development was split in two groups: one for businesses, the other for the telecommunications industry. IMDS would have to accommodate both lines of business.

Mead spent a year getting inside the heads of Bay users to find out how they wanted information presented. The first step was to use something called cluster analysis, a technique brought to Web navigation by Jakob Nielsen, Sun

Microsystems' Web usability guru (see "Jakob Nielsen on Dinosaurs" an interview with Nielsen in *CIO* Section 2, Feb. 1, 1999). Mead enlisted about 25 volunteers representing all departments of the company. Each volunteer sat in Mead's office in front of a stack of 70 cards that listed a type of Web page that would go into IMDS. Each card contained a word designating a category of information, such as product lines, brands, product announcements, authors and approval processes.

The volunteers were told to place the cards in piles representing the way they would like to organize the intranet. Mead hoped to find out how users wanted to arrange and categorize documents. For example, did most users prefer to have press releases for Centillion ATM switches listed under "Centillion," "press releases" or "ATM"?

Mead was surprised by what he learned. People seemed to have two entirely different ways of categorizing information depending on whether they wanted to post information or look for it. When they posted information, most people wanted to organize it by department. For instance, engineers lumped all engineering documents under *engineering*. That tendency, Mead learned, was a holdover from the grassroots intranets that had been created mostly for their own departments.

When asked to wear their information consumer hats, however, most people organized cards differently, placing them under product groups. But even then, they wanted to look at the information in different ways, and those ways had more to do with what they wanted to do with the information than the information per se. For example, some marketing personnel wanted to jump from a product announcement to competitors' product announcements; others wanted to jump from the product announcement to a list of customers that would provide references. Users also wanted to be able to link to a company directory from the name of the author of a document.

Thinking back to his reference librarian days, Mead realized that he was in one sense creating online bookshelves. He had to make finding information on the intranet like finding books in a library. In a library, people used to walk from a card catalog to a shelf in search of a particular book only to find another book a few feet away that serves their needs better. On a computer screen, that doesn't happen, so Mead had to present several ways to find things. He and his fellow knowledge architects would have to create aliases under multiple categories so that multiple links would lead to the same doc-



## KNOWLEDGE MANAGEMENT

ument: Users looking for Centillion press releases would be able to find them under "Centillion," "press releases" and "ATM products." On average, Mead learned, each document would link to four other documents, although some training documents linked to as many as 100 pages because they included refer-

with salespeople who could give them valuable feedback. Mead figured that a feedback button for salespeople to offer critiques online would help close that disconnect. The IMDS team also had to make sure related documents, say, a product spec sheet and a report outlining competing products, were linked. Sometimes,

he found, a product would be improved, but the company's official competitive analysis report wouldn't reflect that improvement. Mead was determined that with IMDS, when a product's specification changed, it should be easy to find all the related documents that need updating. "A lot of processes got bogged down by poor information flow," Mead says.

Mead identified a troubling bottleneck between engineering and marketing, particularly during the development of new products when people in different departments needed to sign off on marketing collateral and engineering documents. During that process, he found, a document would occasionally stall at a desktop for a day or two while someone tried to figure out who needed it next. To keep things moving, Bay used Documentum Inc. workflow software, which can provide a road map for document routing.

Mead was less than pleased when the information flow research led from logistic analyses to a politi-

cal quagmire. The problem was access: Who gets to see what and when. To keep competitors guessing about its strategy, Bay, like most companies, likes to keep a tight rein on new technical developments.

Mead learned that most projects follow a pattern in which the earliest stages are the most secretive. Products such as the Accelar family of data switches begin with an early conception and development phase primarily driven by operations and engineering executives. Next, product engineers start design. As a proj-

ect moves forward, finance, marketing, public relations and sales get involved. After each project milestone, more people see specifications.

To make the matter more confusing and perhaps more galling, access privileges were assigned by role, not by title. A project manager has access to everything she needs for her own project but is shut out from information about other projects. She can call up the competitive analysis document that compares her product with the same technology Cisco Systems Inc. and other competitors have on the market, but she won't be able to see the comparable document for other products. In the latter stages of a project, it often gets harder to keep a lid on information. Key customers test new products, and Bay's salespeople occasionally hear about new product release dates from customers before they hear about them through official internal channels. "When the person in the next cube gets inside information before you, people get irked," says Fox.

The company's solution to all this was the formation of something called the New Product Introduction Council. Comprising representatives from engineering and marketing, this 20-person committee was charged with making the tough decisions on information access. With the power of the committee behind access issues, Bay found, workers complained less about being kept in the dark. It was Mead's job to take the committee's decisions and build them into IMDS. To do that, the project team created a Lightweight Directory Access Protocol, a central password clearinghouse that automates security access privileges. Because IMDS delivers information on the fly in dynamic HTML, users see documents only for which they are allowed access.

After studying user preferences, workflow and security access, the IMDS team was ready to design the system. For inspiration, they looked to other Web sites. First, they looked at their competitors' sites, studying their navigation schemes. Then they checked out Yahoo, Amazon.com and other popular sites, borrowing ideas liberally and figuring that copying the most popular Web sites would result in an interface that was familiar to most users.

Consequently, IMDS mimics Yahoo's



**Steve Larsen, senior manager of knowledge systems, proposed that Bay Networks link its many pages in one centralized system.**

ences to multiple products, industry-specific sales tips and technical strategies.

Mead also had to figure out how information moved through the company. In fall 1997, Mead began a three-month program to study information flow. He sat down with about 70 people representing every area of the company for one-on-one interviews. Mead asked the volunteers to describe from whom they received documents and to whom they sent them. What he found wasn't encouraging.

In one case he learned that the people who wrote sales copy had little contact



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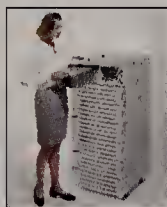
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strategy of presenting categories before drilling down to documents. Because Mead and his team had learned that users wanted several ways to find documents, they built multiple indexes. Users can now look for documents alphabetically and chronologically. They can also look at a group of documents by type—all the white papers for ATM products, for example.

Mead's research revealed that users had strong opinions about how the system should look and feel. "They said, 'We don't have enough bandwidth in a

replaced it with three separate ones.

Ten users test-drove the system after Silva. Mead had them search for 10 documents that they would need in their day-to-day activities. The test didn't go well. Most users couldn't find what they were looking for. The main problem was that most information had been grouped by either product category or department, yet a lot of important documents didn't fit those categories. For example, Bay has product presentations and sales tip sheets to sell products to the banking industry. The IMDS team had to create

aware of the various indexes—alphabetical, chronological, departmental—that were available. So the IMDS team added a button that linked to all the indexes. Since then, things have run more smoothly, and most Bay Networks users have high praise for the system. Tyson Kostan, systems engineering manager, recently used IMDS to calm the Y2K fears of a key customer. By clicking on Y2K in the index, Kostan found a list of Bay's Y2K-compliant products, a list of software products the company feels needs remediation and a presentation

“To get information in the old days, I would have to shoot e-mails to several people. It would take days.”  
—Systems Engineering Manager Tyson Kostan

hotel room to look at spinning wheels and fancy graphics,” Taborga recalls. So the IMDS team strove for simplicity and used graphically sparse, low-bandwidth forms and templates.

In January 1998 the project team had a prototype ready to go, and Mead sought its first critique from a user. Jill Silva, Bay's external Web manager, did the honors. Because of her constant need for new information as well as her experience providing information to a boatload of users, Silva was a natural for the test. She, along with several others, poked and prodded the system for three months. She was on call to the team, talking in person or by phone to IS and knowledge systems people five times a day. And the two parties didn't always agree. Silva remembers a debate over a template to enter document attributes—key words, a brief description and where to route it—that forced her to scroll down three screens. That slowed performance. At her suggestion, the project team agreed to scrap that template and

new categories, like “financial services” and “ISP market,” to suit industry-specific documents. It then had to link them to related products. When a sales presentation on the banking industry referenced the Optivity Network Management software suite, the presentation would have to link to the Optivity product line.

The confusion took 40 days to fix. When Mead was done, the prototype that had resembled a single decision tree had evolved into something that he describes as a group of trees that allowed cross-pollination. Because knowledge architects added more than a thousand links among documents, users could get to the same information via many more paths than in the prototype version.

When a group of 15 users tested the revamped system, they were able to find all 10 items. In May 1998 the intranet was officially rolled out to 7,000 Bay users, and yet another problem became immediately apparent: Users weren't

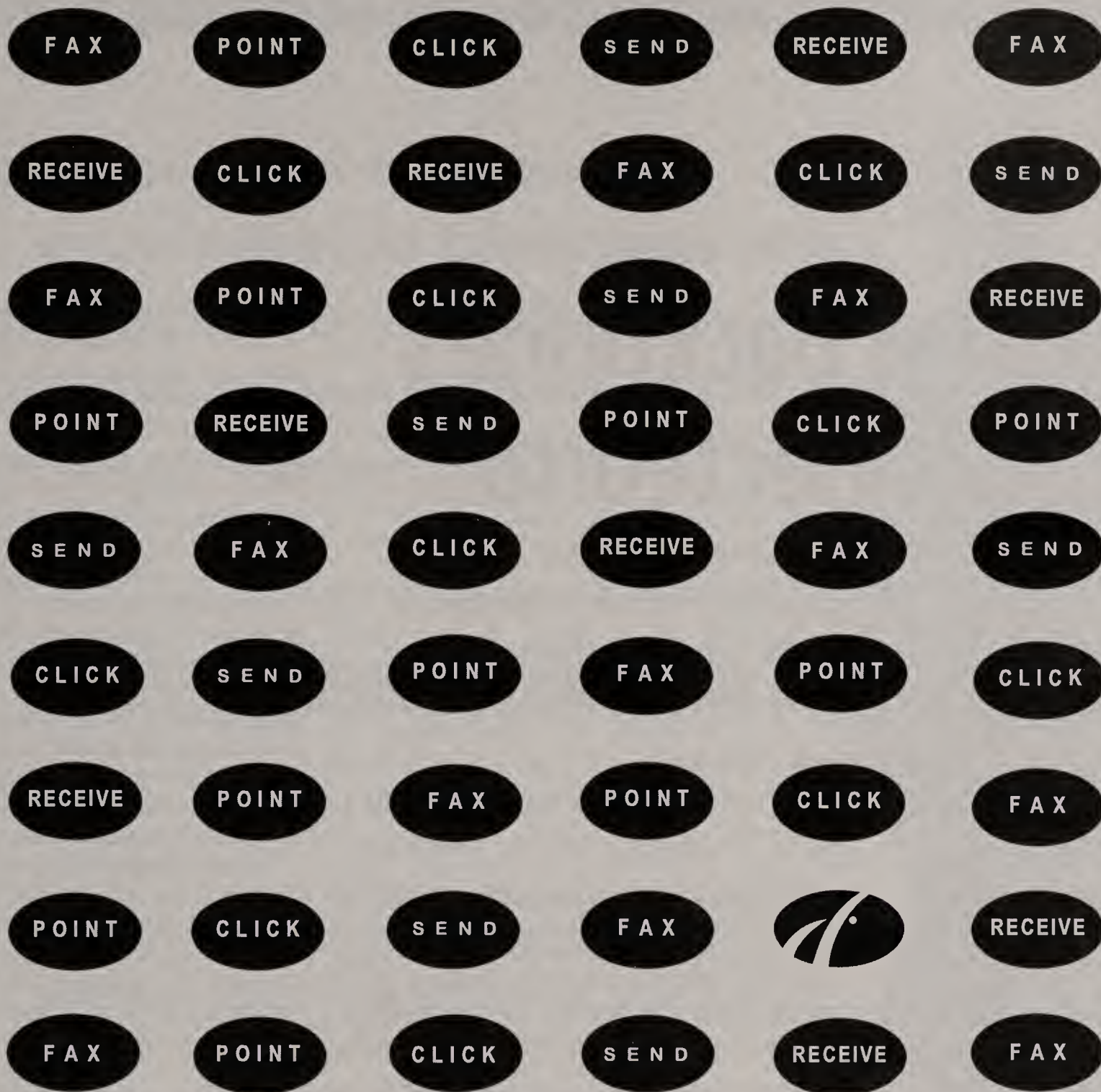
that a colleague gave on Y2K.

“To get that information in the old days, I would have had to shoot out e-mails to several people in product marketing and the legal department,” Kostan says. “It would have taken days to get it.” Guess, who used to spend hours looking for documents, says she can now find anything she needs in less than 15 minutes.

As for Mead, he got the news last September, when he learned that Nortel Networks, the \$18 billion telecommunications giant, was buying Bay Networks. Suddenly Mead had to integrate his system, which had 23,000 documents and 7,000 employees, with one that had 466,000 documents and 75,000 employees. For most people, a scale up of that magnitude would seem like a nightmare. For Mead, whose hankering for a challenge had not diminished, it was a dream come true. **CIO**

Senior Writer Peter Fabris can be reached at [pfabris@cio.com](mailto:pfabris@cio.com).





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# The Backbone's Connected to...

*Cable modems and ADSL propel high-speed Internet access from wishful thinking to reality—but create new headaches as well*

BY JOHN EDWARDS

**A**

N EMERGING GENERATION OF HIGH-BANDWIDTH access technologies, such as cable modems and asymmetric digital subscriber line (ADSL) services, is starting to give Internet users the ability to obtain streaming media, ultrafast software downloads and other high-bandwidth options at acceptable quality levels.

By 2003, 16 million U.S. households—one-quarter of all homes with Internet access—will have high-speed connections, according to a recent study by Forrester Research Inc. in Cambridge, Mass. Cable will lead the charge with more than 80 percent of broadband households using cable-based Internet service providers (ISPs) such as MediaOne. (Forrester didn't include businesses in its study.) The other 20 percent will be connected by ADSL, a copper-wire-based technology whose performance varies widely based on line conditions and distance from the telephone service provider (see "More Alphabet Soup," Power Source, CIO Section 2, June 1, 1998).

But as more people begin to measure access speeds in terms of megabits rather than kilobits, Web site operators already find

themselves increasingly hard-pressed to deliver cutting-edge services. For instance, last year's news events, such as astronaut John Glenn's return to space and the release of the Kenneth Starr report leading to President Clinton's impeachment, brought tens of thousands of high-bandwidth-equipped Web users to CNN.com, MSNBC.com and other news sites, hoping to view video and download multiple volumes of text. Yet many received server error messages, painfully slow data streams and other indicators of overwhelming network congestion. Similar traffic jams have occurred when software companies made new or updated programs available on their Web sites.

Rich Lappenbusch, director of Internet operations for MSNBC in Redmond, Wash., describes the Glenn launch as a wake-up call for site operators that provide high-bandwidth services. "It was a total bomb—an almost total seizure of



ILLUSTRATION BY JOHN BERRY

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<sup>1</sup>U.S. Dept. of Commerce "The Emerging Digital Economy," 1998 <sup>2</sup>Life of fund is as of inception date: 6/29/90. <sup>3</sup>Average annual total returns include changes in share price, reinvestment of dividends and capital gains, and each fund's 3.00% sales charge and trading fee. Share price and return will vary and you may have a gain or loss when you sell your shares. All Select equity portfolios have a \$7.50 exchange fee and a 0.75% short-term trading fee on shares held 29 days or less. On shares held 30 days or more, the trading fee is the lesser of \$7.50 or 0.75%. Fidelity Distributors Corporation.

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the Internet," Lappenbusch says. He compares the situation to all the tenants in an apartment building demanding hot water simultaneously: The infrastructure can't meet the demand.

### Bargaining for Bandwidth

Jeff Garrard, senior executive editor for Atlanta-based CNN Interactive, says his organization, like many of its competitors, prepares for major events by acquiring additional bandwidth. "We go to a third party and say, 'Can you provide us this much bandwidth tomorrow or a week from now?'" Garrard wouldn't state exactly how much bandwidth the company requests, cit-

**"Web networks are like phone networks; there's not an infinite capacity."**

—Jeff Garrard, CNN Interactive

ing competitive reasons. But he notes that even the most careful planning can go awry when a breaking news event prompts users to storm news sites en masse, demanding immediate service. "Web networks are like phone networks; there's not an infinite capacity," he says.

InterVu Inc. of San Diego is one of several companies working with backbone providers to supply bandwidth services to Web sites. Ed Huguez, InterVu's chief operating officer, says the company usually has no problem providing its clients with additional bandwidth as long as they ask far enough in advance. Huguez defines adequate notice as anywhere from several hours to a couple of days, depending on how much bandwidth the customer needs. "Finding sufficient bandwidth is not a problem; you just go out there and buy it," Huguez says.

MSNBC's Lappenbusch blames much of the network congestion problem on ISPs that fail to provide sufficient bandwidth to their ADSL and cable-modem customers despite promises to the contrary. A major news story, such as the Glenn launch, only aggravates the situation. "We had servers that were ready to serve streams, but many people couldn't make it through all the hoops to get here," Lappenbusch says.

## Even More Information, Please

*Web databases are a business necessity*

**T**HERE ARE AS MANY REASONS to consider adding a database to your Web site as there are to launch the site in the first place. Among other benefits, databases let webmasters customize data for individual visitors, generate and deliver content dynamically and track the ever-growing number of Web-based transactions.

If you've already got an infrastructure for your Web site, that may dictate some of the technological considerations in deciding whether to use a database.

But if you're planning to serve large numbers of either internal or external customers and want to be able to change and update your site without reconstructing it from scratch each time, there's little to consider: You need a database.

At Bidder's Edge Inc., a Burlington, Mass.-based start-up portal site for online auctions, the decision for choosing a Web site database depended on matching technological requirements to the business's needs. Given the online auction market's rapid growth, Bidder's Edge executives expect their site, which already claims 200,000 users and 900,000 page views per day, to scale quickly. Bidder's Edge currently covers about 10 of the top online auction houses

and expects that number to grow to 50 over the next year. Both the current use and anticipated growth place great demands on the database,



emphasizing the need for the software engine to be able to grow to meet demand.

"We decided we didn't want to start out with a Cadillac solution," says Peter Leeds, Bidder's Edge vice president of technology. "We needed something that would be highly scalable and offer good price performance." For that reason, Leeds chose a Windows NT-based Informix database, a combination offering Bidder's Edge the technological flexibility its business needs dictate and making its future considerations much easier.

For more information on Web databases, read *Choosing a Database for Your Web Site*, by John Ashenfelter (John Wiley & Sons, 1998).

—Steve Singer





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## Easy on the Backbone

Matthew Kovar, senior analyst with The Yankee Group, a Boston-based technology research company, acknowledges that some ISPs gum up the delivery of high-bandwidth services to their customers. But he says the situation is much better at the backbone level. Bottlenecks most often occur at public Internet exchange points, such as where the data stream switches between backbones, says Jean-Noel Moneton, vice president for advanced services at Infonet Services Corp., an El Segundo, Calif.-based Web hosting company. Moneton adds that the private pairing agreements that many Web hosting companies have reached with major backbone providers afford some relief. Such arrangements allow hosters to speed performance by giving a beeline to a site rather than by requiring multiple hops between different backbone providers.

Kovar and Moneton agree that high-bandwidth backbone capacity is abundantly available and that prices have just about fallen to a "commodity level," meaning that bandwidth prices are falling and that all backbone providers generally charge the same rate for a given amount of bandwidth. Yet transmission costs vary widely, hinging mostly on the amount of bandwidth a company intends to buy.

Greg Carpenter, group program manager of Microsoft Corp.'s Windows media technologies group in Redmond, says currently available communications tools—ranging from fast copper and optical fiber connections to satellite links—offer Web site operators plenty of high-bandwidth choices. "We see lots of competing network technologies—all we look for is a

**"You can't assume that by loading your site with a bunch of do-dahs that you're automatically providing additional benefits to your users."**

—Graham Cannon, *Time Inc. New Media*

network that passes IP [Internet protocol]," he says. "Any technology that makes it easier to deploy high-bandwidth technology is good news."

Within a few years, emerging communications technologies, such as the fiber-optic-based OC-192 specification, should send bandwidth prices plummeting, predicts Jack Danahy, director of planning for GTE Internetworking, a backbone provider based in Cambridge, Mass. Meanwhile, he predicts, Web traffic will soar down lines at speeds many times what's currently available.

Even with bandwidth costs falling, many Web site operators worry about the expense of providing bandwidth-hungry content. Even MSNBC, backed by deep-pocketed corporate giants Microsoft and General Electric Co., is uneasy about the day when millions of ADSL and cable modem users appear online. MSNBC's Lappenbusch explains, "We can partner with somebody, and they can say, 'OK, would you like to buy that much bandwidth for a million dollars a year?' But there's no ad rev-

## BROWSER



## Big Picture Approach

**N**COMPASS LABS INC. CITES THREE MAIN REASONS for Web site failure: poor design, ineffective publishing processes and inflexible, overly complicated structure. The Vancouver, British Columbia-

based software company says its **Resolution 2.0** Web authoring system can combat all three. Resolution 2.0, a client/server package with a

database, provides a single framework for design, content authoring and publishing, and site management. Easy-to-use features include template-based page formatting, self-service authoring and advanced publishing features for delivering personalized, up-to-date content. The system also supports backup, recovery and performance

monitoring and allows Web teams to change design and navigation without affecting content or link consistency. The system begins at \$39,000 for 10 author seats, 2 designer seats and the basic template package, with add-ons available. For more information, visit [www.ncompasslabs.com](http://www.ncompasslabs.com) or call 604 606-0950.

—Anne Stuart

## Taking Teamwork Online

**C**HUCK DORNBUSH FIRMLY BELIEVES THAT LEARNING should be enjoyable. So in 1997 he founded Athenium LLC, a Cambridge, Mass.-based learning system developer that offers the **TEAMThink Learning Game**. TEAMThink consists of Java-based Internet software that enables team-based collaborative learning using a standard Web browser. Instead of downloading or viewing material and learning it by rote, participants use TEAMThink to expand on initial "seed content" created by a curriculum designer. Quiz questions based on the initial content then can be stored in a knowledge base of business information and accessed as needed. TEAMThink is recommended for teams of 8 to 10 people. While pricing arrangements vary, TEAMThink is available on an annual end-user licensing fee of \$200 per person with group discounts available. A CD-ROM version of the product is available for \$70,000. For more information visit [www.athenium.com](http://www.athenium.com) or call 617 528-1500.

—Megan Santosus



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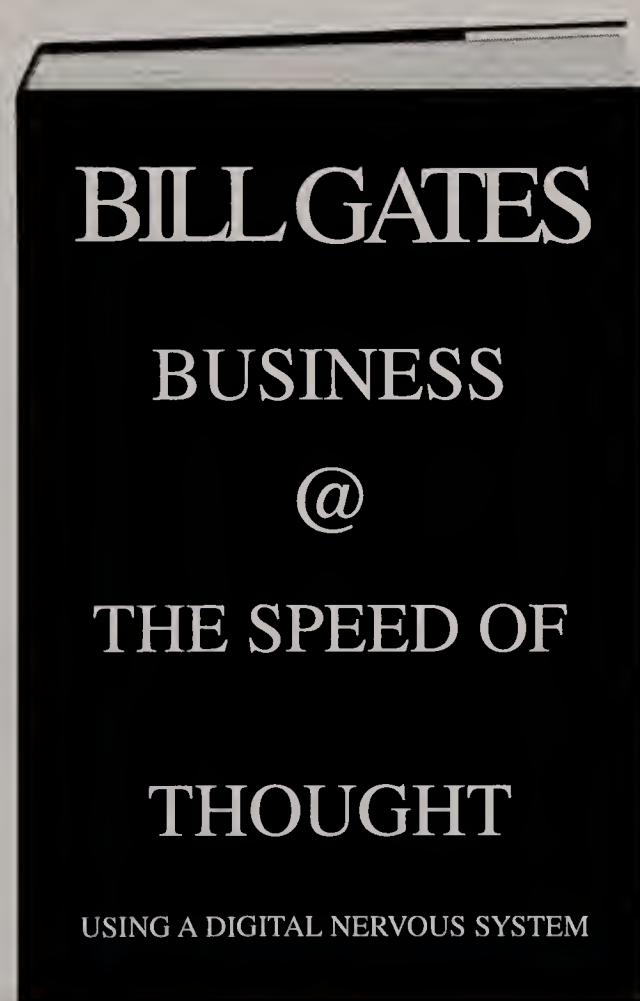
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enue for streaming yet. Suddenly it becomes cost-prohibitive for us to serve the entire nation streaming video."

### Multicasting Provides Relief

Many content providers become victims of their own success, maintains Microsoft's Carpenter. "Each user who connects [into a streaming feed] typically requires an individual audio/video stream," he says. "If the content becomes extremely popular, then the content provider needs to work with its hosting provider to make provisions

Garrard. "With multicast, we may make 20 connections to 20 different data centers, and then they serve maybe 2,000 people."

Rolling out Web multicasting hasn't been easy. The technology requires support from ISPs, router manufacturers and software developers, all of which are supporting the concept in greater, but not yet overwhelming, numbers. "It's still an emerging technology," says Garrard. "But I expect it will be used very widely in the years ahead."

### New Media, New Decisions

Technical and business headaches won't be the only challenges facing Web site operators as high-bandwidth users arrive online in the substantial numbers predicted by Forrester and others. Many organizations will also find themselves struggling with content decisions. Graham Cannon, director of strategy and communications for New York City-based Time Inc. New Media, says site operators will need to select their high-bandwidth offerings carefully. "You can't assume that by loading your site with a bunch of do-dahs that you're automatically providing additional benefits to your users," he says. "What's the purpose of putting a sound bite of the president on your site saying something people have already seen a million times on radio and TV?" MSNBC's Lappenbusch disagrees. He says content providers shouldn't leap to the assumption that Web site visitors are less interested or have shorter attention spans than TV viewers. "If it takes four hours to stream something like the Clinton [1998 grand jury] testimony, it will be a four-hour file," he says.

CNN's Garrard compares the current situation to the early days of television. "The rules are just now being formulated, and many different approaches are being taken," he says. "We're entering a new age and the decisions that are being made today, editorially and technologically, will affect the way people receive information for generations to come." **CIO**

*John Edwards, a freelance technology writer based in Mount Laurel, N.J., can be reached at jedwards@john-edwards.com.*

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**B**UILDING AN E-COMMERCE site on a budget? New York City-based Forman Interactive Corp. offers **Internet Creator E-Commerce Edition**, an authoring tool for Web commerce sites. Features include shopping-cart ordering, transaction processing and interactive forms. A free download of the software is available at Internet Creator's Web site. For \$99, the company offers a CD-ROM that includes the program, sample Web sites built with the program that can serve as templates and clip art. For more information, visit [www.internetcreator.com](http://www.internetcreator.com) or call 212 627-4988.

—Sari Kalin

### Do-It-Yourself Development

**W**OULDNT IT BE GREAT if you could easily handle your employees' training online? Criterion Inc. of Irving, Texas, says its **Cornerstone Enterprise** software for intranets can do just that. For managers, that means no more phone tag with HR to find out which courses—internal and external—are available and best suited to workers' needs. Training directors list courses on Cornerstone and those who have taken them offer their critiques. That way, managers can match employees with courses best suited to their needs.

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—Peter Fabris

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for additional network bandwidth and servers." Costs can quickly soar. Among the solutions Web site operators employ to accommodate all those new high-bandwidth users is multicasting technology. Multicasting works by allowing a server to send a single stream of traffic to multiple users by routing it through an ISP. With bandwidth consumption minimized, Web sites can offer video, audio and software downloads simultaneously to hundreds or thousands of remote users quickly and easily. "The multicast idea gets us away from this one-to-one relationship, which is how you get the bottleneck and cost problems," says CNN's





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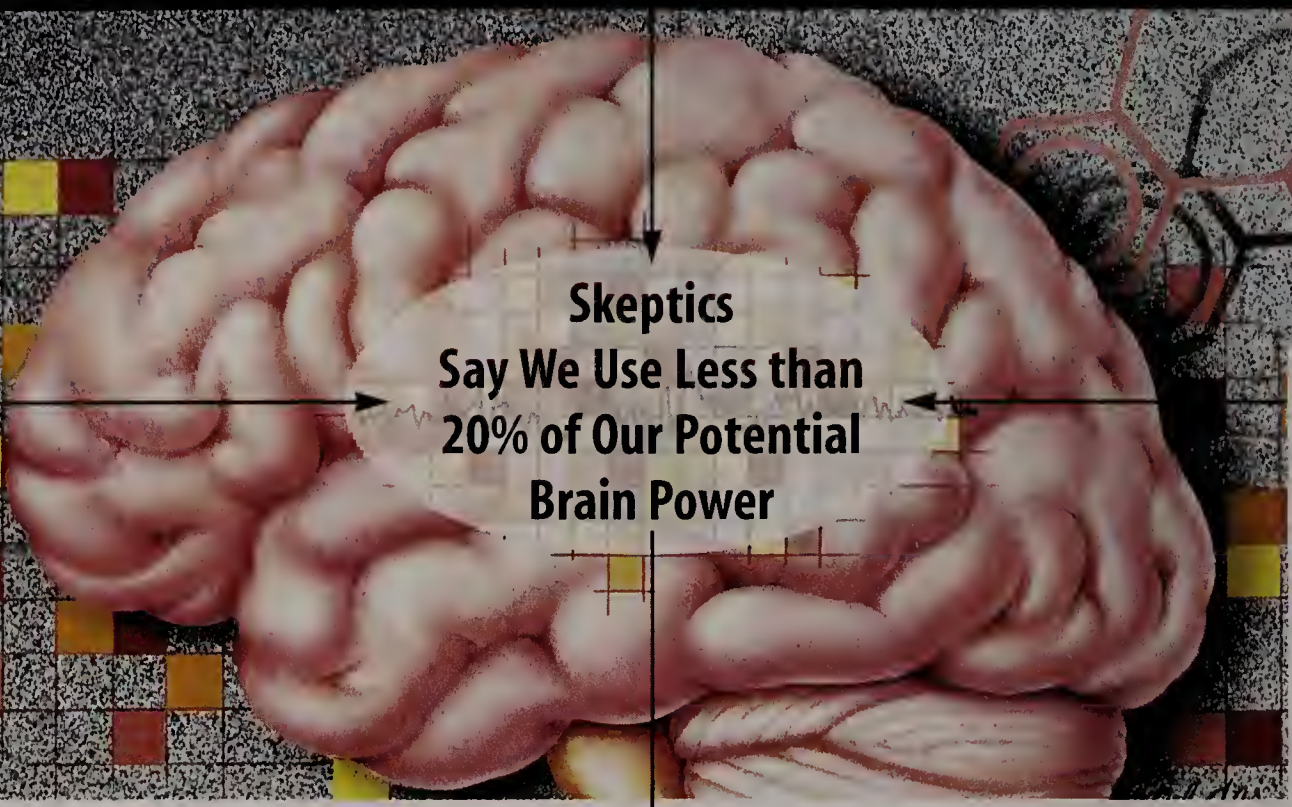
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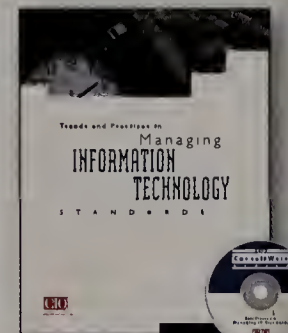
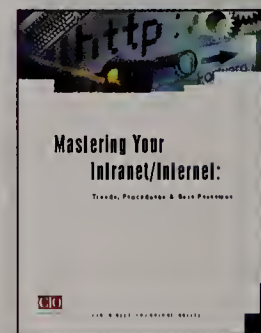
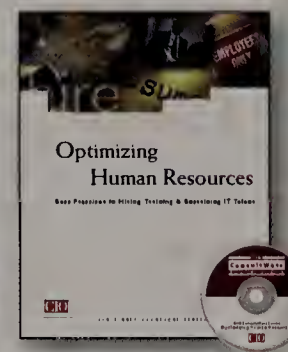
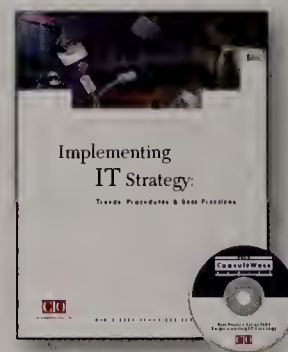
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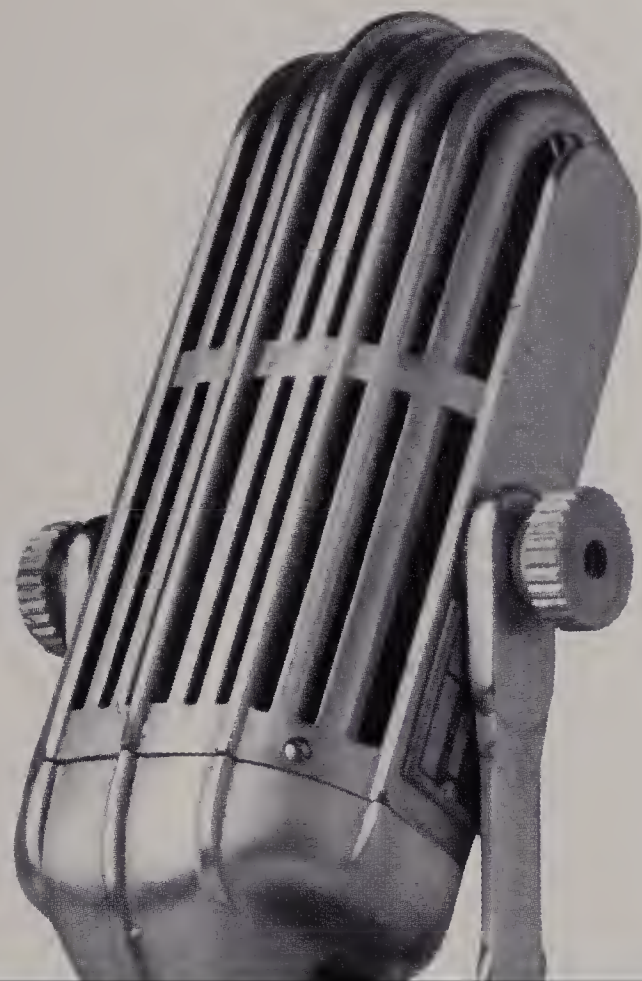
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Q

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